

UNIVERSITY OF TARTU
Institute of Computer Science
Informatics Curriculum

Oliver Stimmer

**Digitizing Helmes Professional Development
Roadmaps**

Bachelor's Thesis (9 ECTS)

Supervisor: Fredrik Payman Milani, PhD

Tartu 2016

Digitizing Helmes Professional Development Roadmaps

Abstract:

Current thesis is about digitizing Professional Development Roadmap in Helmes. Helmes, an international software services company, strives to have a world leading professional development for its employees. To achieve this, Helmes has implemented a Professional Development Roadmap for every software developer. Professional Development Roadmap is a structured set of competence levels, expectations and recommendations of what, how and when a developer needs to improve in order to efficiently develop professionally. Helmes had the Professional Development Roadmaps in the form of physical booklets, which had several restrictions such as difficulties when updating its contents.

This thesis aims to solve the problems associated with a physical booklet to create, maintain and develop Professional Development Roadmaps. The author applied business analysis for identifying the underlying business needs, analyse the current situation and finally, select and implement a solution that addresses the current needs and problems.

The problems were solved by developing a web application which enables to manage Professional Development Roadmaps and keep track on the employees' Professional Development Roadmaps. In result, Helmes specialists have latest version of Professional Development Roadmap and it is better to support employees' professional development.

Keywords:

Business analysis, Scrum, professional development in a software company, professional development plans

CERCS: P175

Ametialaste arenguplaanide digitaliseerimine Helmeses

Lühikokkuvõte:

Käesolev töö räägib ametialaste arenguplaanide digitaliseerimisest Helmeses. Helmes on rahvusvaheline tarkvaraarendus ettevõtte, mis soovib tagada oma töötajatele tipptasemel ametialase arengu maailmas. Selleks on Helmes välja töötanud arenguplaanid tarkvaraarendajatele. Arenguplaan sisaldab struktuursel kujul kompetentside tasemeid, taseme ootuste kirjeldusi ja soovitusi, mida, millal ja kuidas vastavaid kompetentse efektiivselt omandada. Enne käesolevat tööd oli arenguplaan Helmeses füüsilise vihikuna. Füüsilisel vihikul on mitmeid puudusi, näiteks on füüsiliste vihikute sisu uuendamine keeruline.

Töö eesmärgiks on lahendada probleemid ametialase arenguplaani füüsilise vihiku kujul olemisega selliselt, et oleks võimalik luua, hallata ja arendada arenguplaane. Töö autor teostab ärianalüüsi, et tuvastada reaalne ärivajadus, analüüsib hetke olukorda ning leiab lahenduse, mis lahendab hetke probleemid ja vajadused.

Töö käigus arendati veebirakendus, mis võimaldab hallata arenguplaane ja olla kursis töötajate ametialase arenguga. Tulemusena on kõigil Helmese spetsialistidel ajakohane arenguplaan ning töötajate ametialast arengut on võimalik paremini toetada.

Võtmesõnad:

Ärianalüüs, Scrum, ametialane areng tarkvaraettevõttes, ametialased arenguplaanid

CERCS: P175

Table of Contents

Introduction	5
1 Methodology	6
1.1 Business analysis	6
1.1.1 Role of the business analyst	6
1.1.2 Used business analysis techniques	6
1.2 Scrum.....	7
1.2.1 Scrum Team	7
1.2.2 Product Backlog	8
1.2.3 Sprint.....	8
2 Helmes.....	10
2.1 Background of Helmes	10
2.2 Professional development support from Helmes.....	11
2.2.1 Candidate's competences are tested and assessed	11
2.2.2 Candidate joins Helmes.....	12
2.2.3 Employee improves his/her competences	12
2.2.4 Development Discussions	13
2.2.5 Employee leaves.....	14
2.3 Professional Development Roadmap	14
2.3.1 Physical booklet Development Plan structure.....	15
2.3.2 Usage of Professional Development Roadmap	16
3 Current state of professional development in Helmes	18
3.1 Current state process.....	18
3.1.1 Creating Professional Development Roadmap	18
3.1.2 Technical Development Discussion	19
3.1.3 Regular Development Discussion	21
3.1.4 Specialist improves him/herself using Professional Development Roadmap 23	
3.2 Problem analyses	24
3.2.1 List of problems in current state.....	24
3.2.2 Main problems regarding to Professional Development Roadmap booklet .	26
4 Target state of professional development in Helmes	27
4.1 Target state models.....	27
4.1.1 Creating Professional Development Roadmap	27
4.1.2 Technical Development Discussion	28

4.1.3	Regular Development Discussion	30
4.1.4	Specialist improves him/herself using Professional Development Roadmap 31	
4.2	Additional benefits of digitizing Professional Development Roadmap	32
4.3	Application requirements	32
4.3.1	Non-functional requirements	32
4.3.2	Functional requirements	32
5	Delivering the application	34
5.1	Alternative ways to achieve the target state	34
5.2	The development of the application	35
5.3	Alpha users' program	35
6	Results	37
6.1	Application overview	37
6.1.1	Development Plan structure	37
6.1.2	Functionalities	38
6.1.3	Usage of the application	39
6.2	Problems solved.....	40
6.3	Future development recommendations.....	41
7	Conclusions	43
8	References	44
	Appendix	46
I.	Definitions.....	46
II.	List of roles and employee levels before the application	47
III.	Software Developer Development Roadmap booklet structure	48
IV.	Professional Development Plan system database model.....	50
V.	Application feature list	51
VI.	Professional Development Plan users' rights	53
VII.	Alpha user's prequestionnaire	55
VIII.	Alpha users after questionnaire.....	56
IX.	List of roles and levels in the application	57
X.	SQL scripts	58
XI.	A letter from Head of Software Development	60
XII.	License.....	61

Introduction

Helmes is an international software services company. Helmes's goal is to become the best software services company in the world and the mission is to ensure the fastest and the most efficient employees' professional development as comparing to other IT companies. Helmes applies several means to support employee's professional development. One of the mean is the Professional Development Roadmap. Professional Development Roadmaps are a structured set of competence levels, expectations and recommendations of what, how and when professionals need to improve their competences and how to achieve it efficiently. It describes the developers needed competences and recommendations and how to improve needed competences from a beginner to an expert level. When the developer knows, how to improve his or her competences, he/she can start working with it. In this way, the Professional Development Roadmaps directly supports the employees' efficient professional development.

Helmes created, maintained and updated all information about a developer's professional development in a physical booklet. A physical booklet has many restrictions, such as keeping the content up-to-date. Another restriction is that the progress, which is marked to the physical booklet cannot be searched conveniently. This thesis aims at finding a solution to the current problems of having the Professional Development Roadmap as a physical booklet.

To this end, business analysis is conducted to find the best suitable solution. The foundation of the solution is to digitize the Professional Development Roadmaps. The thesis presents the business analysis work conducted in this context and gives an overview of the first version of the solution, which was developed by using the Scrum framework.

In the first chapter of the thesis, Business analysis and Scrum methodology are described. In the second chapter, an overview of Helmes and how employees' professional development is supported and what is a Professional Development Roadmap, is given. In the third chapter, the current state of the situation is described. Then, in the fourth chapter, the target state is discussed. The fifth chapter describes how the application was developed and the sixth chapter gives an overview of the built application, its usage, and results from introducing the application to Helmes organization.

1 Methodology

There was used business analysis to understand the actual need of digitizing Professional Development Roadmap (see definition 4). The application was developed using Scrum framework.

1.1 Business analysis

“Business analysis is the set of tasks and techniques used to work as liaison among stakeholders in order to understand the structure, policies and operations of an organization and to recommend solutions that enable the organization to achieve its goals.” [1] Business analysis may be conducted in order to understand the current state of an organization or serve as a basis for the later identification of business needs. Most often business analysis is performed to define and validate solutions that meet business needs, goals or objectives. [1]

1.1.1 Role of the business analyst

A business analyst is any person who performs business analysis activities. The business analyst is responsible for eliciting the actual needs of stakeholders, not simply document their expressed desires. Therefore, business analysts must interact by large number of people who interact with the business (stakeholders), for example customers, staff, IT professionals and executives. Business analyst must analyse and synthesize information provided by the stakeholders. Business analysis practitioners are not only people with job title business analyst. Many roles, for example systems analysts, product managers, product owners, business architects and consultants may practice business analyses in their job. [1]

1.1.2 Used business analysis techniques

There were used following business analysis techniques in the thesis to collect and analyse information:

- Interviewing
- Stakeholder analysis
- Observations
- Process modelling and analysis
- Document analysis

An interview is a systematic approach designed to elicit information from interviewee. The interviewee can be a group of people or one person. One-on-one interviews are typically most common. Interviewer is asking relevant questions and documenting the responses. Successful interview depends on several factors, for example: readiness of interviewee to provide relevant information, degree of clarity in interviewee’s mind about what the business requires of the target system and the experience of the interviewer. [1, pp. 177 - 178] Interviews were conducted with all the main stakeholders (see Figure 2.6).

The goal of the stakeholder analysis is to identify the stakeholders who may be affected by a proposed initiative or who share a common business need. It is needed to determine stakeholder influence and authority regarding the approval of project deliverables. [1, p. 24] Stakeholders map is visual diagram that show the relationship of stakeholder to the solution and one another. One of the most common stakeholder map is a matrix mapping the level of stakeholder influence against the level of stakeholder interest. [1, p. 29]

Observation is a mean of eliciting requirements by assessing the stakeholder’s work environment. This technique is appropriate to use when documenting details about current pro-

cess or the project is intended to enhance or change a current process. [1, p. 186] Observation provides realistic and practical insight into the business by getting a hands-on feel for how the business process works today. Observation helps to elicit the details of informal communication and the ways people actually work that may not be documented anywhere. Observation may not work well if the current process involves a work which is not easily observable, for example high level of intellectual activity. The observation can be time-consuming and be disruptive to the person being shadowed. There must be considered that unusual exceptions and critical situation happen infrequently and may not occur during the observation. [1, p. 188] Author of thesis observed two Technical Development Discussions.

The purpose of process modelling is to understand how the work that involves multiple roles and departments, is performed within an organization. A process describes how multiple people or groups collaborate over a period of time to perform work. A process model is a visual representation of the sequential flow and control logic of a set of related activities or actions. Process model gives a graphical representation of a current or future process within an organization. [1, pp. 192 - 193] Business process modelling forces to think through and formalize its understanding of processes. This helps to spot potential improvements, such as the removal of the steps, automation of manual steps or reengineering the flow. [2] There were modelled Current state (see chapter 3) and Target state (see chapter 0) processes.

Document analysis is a mean to elicit requirement of an existing system by studying available documentation and identifying relevant information. Document analysis is used if the objective is to gather details of existing solutions including business rules, entities and attributes that should be included in a new solution. [1, p. 169] There were conducted document analysis to Helmes internal documents and information accessible from Helmes internal web.

1.2 Scrum

Scrum is an agile framework for completing complex projects [3]. Agile software development is a way of managing IT development teams and projects. The word agile derives from agile manifesto. The agile manifesto was put together in 2001 by a small group of people who felt that traditional approach of managing software development projects was failing too often. Most important values in agile manifesto are: working software over comprehensive documentation, individuals and interactions over processes and tools, Customer collaboration over contract negotiation and responding to change over following a plan. [4]

Scrum is a framework where people can address complex adaptive problems while productively and creatively delivering products of the highest possible value. The Scrum framework consists of Scrum Team and their associated roles, events, artifacts and roles. Each component serves a specific purpose and is essential to Scrum's success and usage. [5] When applying Scrum, it's not necessary to start a project with a lengthy, upfront effort to document all requirements. Typically, a Scrum team and its product owner begin by writing down everything they can think of for agile backlog prioritization. [6]

1.2.1 Scrum Team

The Scrum Team is made up from Scrum Master, Product Owner and the Development Team [5]. A Development Team is a cross-functional team that is responsible for developing the product. The team works together while building the application. The activities between team members are aligned in a way that the goals associated with a specific sprint are achieved. The Development Team may consist of developers, business analysts, testers, etc.

[7] Size of the Development Team should be between three to nine persons. The Development Team should be small enough to remain nimble and large enough to complete significant work within a Sprint (see chapter 1.2.3). Less than three members decreases interaction and results in a smaller productivity gains. More than nine members requires too much coordination. The role of the Scrum Master is to ensure that Scrum is understood and enacted. Scrum Masters adheres that Scrum Team adheres to Scrum theory, practises and rules. [5]

Main responsibility of the Product Owner is maximizing the value of the product. Product Owner works together with the Development team and he/she must be available for his/her team. The best Product Owners show commitment by doing whatever is necessary to build the best product as possible and it means being actively engaged with his/her team. The product owner must be business savvy, because he/she is a decision-maker regarding what features the product will have. Product Owner should understand the market, the customer and business in order to make sound decisions. The Product Owner role requires working closely with the key stakeholders throughout the organization and beyond, meaning Product Owner must have good communication skills. He/she must be able to communicate different messages to different people about the project during the project at any time. [8] Product Owner's main responsibility is to manage Product Backlog including its content, availability and ordering. [5]

1.2.2 Product Backlog

The main Scrum's artifact is Product Backlog. "Product Backlog is an ordered list of everything that might be needed in the product and is the single source of requirements for any changes to be made to the product" [5]. The Product Backlog is never complete, it constantly changes. Product Owner must ensure that the Product Backlog is visible and clear to the Development team. [5] The most common way for a Scrum team to express features on the agile product backlog is in form of user stories. User stories are short simple descriptions of the desired functionality told from perspective of the user. [6] User stories are not lightweight requirements given of the business stakeholder to the development team. User stories imply a different model: requirements by collaboration. Business representative and development team member should be in discussion, look at the story from different perspectives and explore options. Discussion allows business representative not only to explain what is wanted, but also ensure that team members understand this. Misunderstanding between different roles is a major problem when just handing over requirements. The most important benefit of discussions compared to hand-overs is that the discussions produce better solutions. Engaging a group of people in analysis from different perspectives helps the team benefit from shared knowledge. [9]

1.2.3 Sprint

Sprint is a time-boxed period where potentially releasable product increment is created. Sprint contains and consists of Sprint Planning, Daily Scrum, the development work, the Sprint Review and Sprint Retrospective. [5] The length of the sprint varies from one week to four weeks. The shorter sprints give more opportunities for team to learn. The shorter cycles make planning easier which increases focus. Working in one week sprints can be more stressful at first and it is easier to start doing Scrum with longer Sprints. [10]

1.2.3.1 Sprint planning

Each sprint starts with sprint planning meeting [5]. Sprint planning is the most important thing in the Scrum [11]. The goal of the sprint planning is to select the right set of product

backlog items to work on during the sprint and feel that each backlog item has been discussed enough that the team is prepared to work on it [12]. Entire Scrum team attends to sprint planning. During the sprint planning meeting, Product Owner describes the highest priority features to the team. The team asks enough questions to turn a high level user story into more detailed tasks in the sprint backlog. [13] Product owner should keep the backlog items at a business level not technical level, because team is normally better suited to figure out how to solve something. [11]

Then team estimates the backlog items and breaks down the items as necessary. When it is asked to provide an estimate, normally the person who understands the story best will give the estimate first. This strongly affects everyone else's estimates. The planning poker is a technique which helps to avoid that. Each team gets a deck of 13 cards with story points on it. All the team members choose the card and after everyone has chosen, the cards are made public. This forces each team member to think for him/herself rather than lean on somebody's else estimate. When there is discrepancy between estimates, team discusses the differences and tries to build a common picture of what work is involved in the story. One of the main activities in sprint planning meeting is to decide which backlog items to take to the sprint. The Development Team decides how much they are able to finish during the sprint. The estimation helps team to decide how much they are willing to commit. [11]

1.2.3.2 Daily scrum

Daily scrum is a meeting for the Development Team to synchronize activities and create a plan for the next 24 hours. The meeting should not last more than 15 minutes. Each Development Team member in the Daily Scrum explains what did he/she do yesterday, what will he/she do today and what obstacles does he/she see. [5]

1.2.3.3 Sprint Review

Sprint Review is held at the end of the Sprint. The goal of the Sprint review is to inspect the work done during the Sprint and adapt the Product Backlog when needed. Scrum Team and stakeholders attend in the Sprint Review. It is Product Owner's responsibility to invite stakeholders to the Sprint Review. Scrum Master must ensure that the Sprint Review takes place and that attendants in the meeting understand its purpose. The Development Team demonstrates the work that has been done during the sprint and answers questions about it. Product Owner discusses the Product Backlog as it stands. The entire Scrum Team collaborates on what to do next, meaning that Sprint Review provides valuable input to subsequent Sprint Planning. [5]

1.2.3.4 Sprint Retrospective

Sprint Retrospective is the last event in the sprint. Sprint Retrospective is an opportunity for the whole Scrum Team to inspect itself and create a plan for improvements for the next Sprint. The goal of Sprint Retrospective is:

- Inspect how the last Sprint went with regards to tools, relations, process and people
- Identify and order the major items that went well and potential improvements
- Create a plan for implementing improvements to the way Scrum Team does its work

By the end of the Sprint Retrospective, Scrum Team should have had identified improvements that they will implement during the next sprint. [5]

2 Helmes

Helmes is an international software services company headquartered in Tallinn, Estonia. Helmes has two software development centres – in Tallinn and Minsk, Belarus. In Helmes Tallinn there are approximately 170 employees, and in Minsk there are 50 employees. Helmes was founded in 1991. Helmes is concentrated on developing business critical tailor software. For example, Helmes has built demand-driven supply chain management information system for international telecom TeliaSonera, which operates in 17 countries with more than 100 million clients [14]

2.1 Background of Helmes

Helmes's revenue was 19.1 million euros and profit 2.6 million euros in 2014. The main markets are Estonia, Lithuania, Norway and Switzerland with revenues in 2014 correspondingly 10.7, 1.9, 1.8 and 1.2 million euros. [15]

Helmes's goal is to become the best software services company in the world and the mission is to ensure the fastest and the most efficient professional development for Helmes's employees comparing to other software services companies. Helmes has defined its employee brand promise „Helmes as a Development Accelerator for employees “.

Helmes is divided into Business Areas and General Administration. The role of general administration is to support Business Areas and CEO. For example, general administration organizes accounting, marketing, recruitment, work environment, internal information systems development etc. Business areas are divided into delivery teams (see definition 6). There are 10 business areas and 23 delivery teams in Helmes. The biggest business areas are “Insurance Solutions”, “Telecom and Logistics”, “Telecom Solutions”, “Progress and Aurea Solutions” and “Hosting and Maintenance”. Business areas and delivery teams are both business units. All business units must be financially sustainable in long term. There are 21 software development teams and two operation teams. The delivery teams consists of Team Manager (see definition 5) and 5 – 7 specialists (definition 1). [16]

Specialist reports to his/her Team Manager, Team Manager reports to Business area manager and Business Area Manager reports to CEO (Figure 2.1. Specialist's reporting chain in Helmes). The average size of the delivery team is 6 employees. In Helmes, software development team has following roles: Team Manager, Analyst, User Experience, Architect, Lead Programmer, Development, Quality Assurance, Deployment, Operations [17]. There must not be separate person in the team for every role. Some persons may have multiple roles and some competences can be outsourced. The Operations team goal is to keep IT infrastructure working. For example, Helmes hosts Web self-care for Estonian Unemployment Insurance Fund [18].

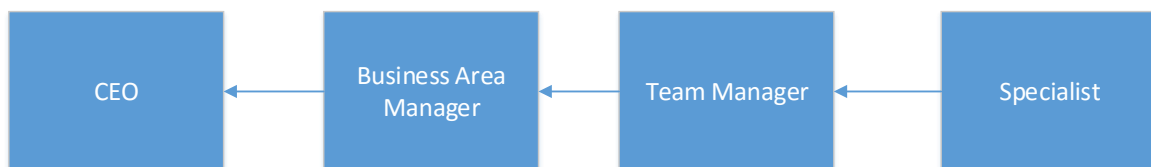


Figure 2.1. Specialist's reporting chain in Helmes

The core of Helmes' company culture is an entrepreneurial attitude, empowerment, autonomy and freedom for teams to do business in the way they consider best [19, p. 1].

2.2 Professional development support from Helmes

Helmes values its employees' professional competences (skills, knowledge and experiences) development. The employees' competences are the biggest resource for Helmes. There is a big lack of competence in IT workforce in Estonia. There is a need for 2661 - 4456 employees with ICT preparation by 2020 [20]. The more highly competent workforce Helmes has, the more value can Helmes offer for its clients.

There is conducted a research in Helmes which indicates that there is a positive correlation between team members' professional development and how successful team is. Team success in Helmes is measured by client's satisfaction (25% weight), team members' satisfaction (25% weight) and financial results (50% weight). The level of people's professional development is important factor influencing the team success. People's professional development in top Helmes teams is on average level while in less performing teams there is a little people professional development. [19, p. 58]

Supporting professional development enables employees to improve their competences faster. The faster employees develop their competences, the more competences Helmes has in a limited amount of time. The more competences Helmes has, the more value can Helmes deliver to customers. The more value Helmes can deliver to customers, the more money can Helmes earn.

When employees feel that they can develop themselves inside the company, it is less likely that they will leave the company [21]. That helps to save from recruiting costs. When company has a reputation that they value professional development, it is easier to recruit new employees as it attracts people who care about their professional development. The fast professional development is achieved by different facilities, for example, Mentor system and Development Discussion system.

When employees feel that the company cares about their professional development, they are more likely to tell good things about the company which helps to support Helmes's reputation as a good employer. The better reputation Helmes has among potential employees, the easier it is to attract new competent employees.



Figure 2.2 Professional development process in Helmes

2.2.1 Candidate's competences are tested and assessed

The support of employee's professional development starts with testing and understanding the possible employee (candidate) competences. Understanding the candidate's competences allows to choose the best role and position which would support new employee's professional development best.

There are many ways how candidate's competences can be assessed and tested:

- Interview with Human Resources
- Interview with direct manager
- Technical test assignment
- Technical interview

- Meeting the team

For every candidate there are at least two interviews. One with Human Resources (either Head of Human Resources or Human Resources specialist) and another one with candidate's direct manager. The goal of these interviews is to understand if the candidate has suitable values and competences to become Helmes's employee on desired position. Most people in Helmes are in developer's role, therefore there are described developer's competences assessment in more detail.

For most of the cases when person is applying for developer's role, then candidate must solve technical test assignment. When developer is capable of proving his competences in another way, for example he/she has previously worked in Helmes, he/she doesn't need to do the test assignment. Technical test assignment's goal is to understand the candidate's technical skills better. Technical assignment for developer's role is a programming task. Candidate solves the technical assignment at home. The test assignment will be discussed in technical interview.

The goal of the technical interview is to understand the candidate's technical skills and potential better. Technical interview for developers is usually carried out by a team's Lead developer. In some cases, for example, when candidate is applying for Lead developer position, other team's Lead developer carries out the technical interview.

The way how technical interview is carried out, varies a lot. It depends on who exactly is carrying out the interview and with whom the interview is carried out. There can be task on the blackboard, puzzle on the paper, doing some real programming together or just talking about candidate's technical skills, experiences and knowledge.

Some teams are doing test day with candidate before hiring him/her. In the test day candidate works together with the team for a day. Test day goal is to understand if candidate suitable for the team. This is currently not very common practise in Helmes yet, but it is getting more popular.

2.2.2 Candidate joins Helmes

On the new employee's first day, there is a meeting with the Head of Human Resource, where the Head of Human Resource describes how things work in Helmes. In that meeting Head of Human Resources introduces also how Helmes is supporting professional development. For employees in developer's role there is given a booklet with Professional Development Roadmap (see chapter 2.3).

2.2.3 Employee improves his/her competences

There is an Internal library, Hack days and a Mentor system in order to support employees' fast professional development. Also trainings are provided regularly for employees. Professional Development Roadmap gives guidelines for employees how to improve his/her competences.

Helmes Internal library has approximately 200 books. There are both e-books and physical books available. Every employee can borrow the book that he/she wants to read. There are new books bought regularly when employees express their wish. Twice a year Helmes organizes Hack days for its specialists. On that day specialists can learn new technologies and work on the projects that are not part of the regular job. The goal is to encourage specialists to think more creatively and offer time for learning new technologies, methodologies, tools etc. Helmes employees attend to the trainings regularly. There are some compulsory trainings for specialists, for example Integration training. Most of the trainings where specialist

attends to, are agreed between specialist and his/her team manager based on specialist's wishes and specialist's mentor recommendations.

The most important professional development comes from carrying out every day working assignments. The principle of giving out assignment is that the assignment must be executable for concrete person. As the competences improve, employee will receive assignments with more responsibility. There are processes built in the everyday working assignments which improves the specialist's competences. For example, there are code reviews and retrospectives held regularly. Code reviews help developers improve their coding practices and retrospectives improve team member's teamwork capability.

Each junior specialist has a mentor in Helmes. Junior specialist is an employee, who is not experienced enough to be fully responsible for his/her work. Usually junior specialists are employees, who have less than one year working experience in concrete role. The final assessment of the specialist's employee level (see definition 2) is done by his/her Competence Leader (see definition 7). Competence Leader is the person who carries out technical development discussions. The Competence Leader must be notably more experienced in the concrete field than the specialist with whom he/she is doing the Technical Development Discussion with. For example, Junior Java Developer's Competence Leader can be his/her team Senior Java developer. The Senior Java software developer's Competence Leader is Helmes's Java Technology Leader. When mentor is not willing or capable of carrying out technical development discussions, the employee's mentor is not the Competence Leader. Usually employee's mentor is also his/her Competence Leader. Assigning the mentor for the specialist is Team Manager's responsibility. Mentor is usually more experienced person from the same team who has the same role, but mentor can also be from another team. Mentee can always turn to his/her mentor with questions or problems. Mentor is responsible for supporting junior specialist's effective learning, work productivity and quality. The mentor must be more competent than the mentee. Mentors also recommend books to read for his/her mentees.

2.2.4 Development Discussions

At least once a year the Team Manager must organize two development discussions for his/her specialists: regular development discussion and technical development discussion. Head of Human Resources makes sure that the discussions are held. 90% Helmes employees answered employees' satisfaction survey in 2015 that somebody has talked with him/her about his/her professional development.

Both (technical and regular) development discussion are scheduled by the Team Manager (Figure 2.3. Development discussions in Helmes). Team Manager sends the summary of regular development discussion to Head of Human Resources by email. Competence Leader sends the summary of Technical Development Discussion to Team Manager and Head of Human Resources by email.

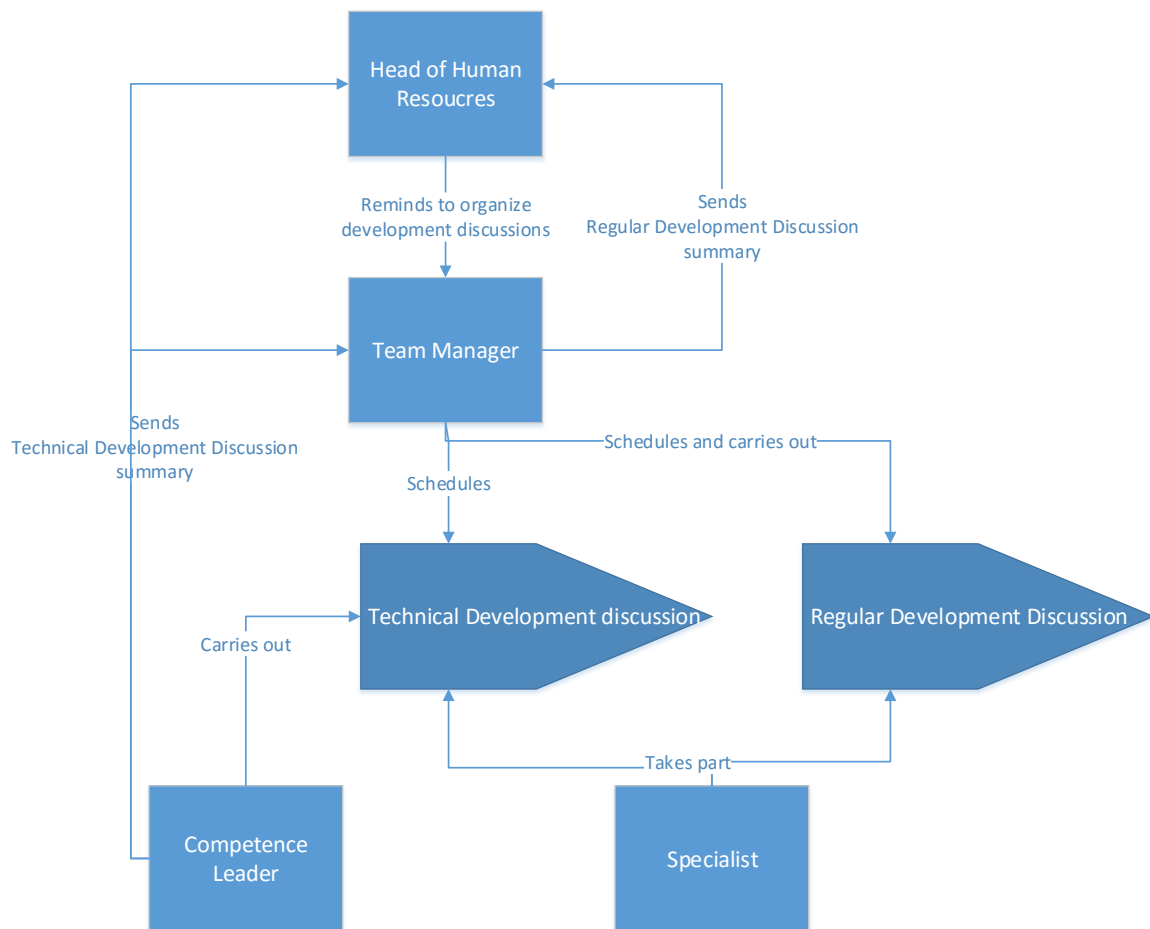


Figure 2.3. Development discussions in Helmes

2.2.5 Employee leaves

Average Estonian ICT sector employees' attrition rate was 12% while Helmes employees' attrition rate was 8% in 2014 [22]. Meaning Helmes is quite good at keeping its employees. Still there are some people who leave Helmes. The main reasons why employees leave is:

- after working long period (more than five years) in Helmes people look for new challenges
- employee gets offer with higher salary from another company
- employee is not capable of carrying out assignments which came after moving to the position with larger responsibility
- employee works too hard and burns out

2.3 Professional Development Roadmap

There are Professional Development Roadmaps for the main roles that Helmes has. Professional Development Roadmap is a structured set of competence levels, expectations and recommendations of what, how and when a professional need to improve their competences and how to do it efficiently. The Professional Development Roadmaps framework has been made by Meelis Lang who is the Head of Software Development in Helmes. The content in the Professional Development Roadmap is made by Meelis Lang together with Helmes's Competence Managers. Competence Manager is a top expert in his/her field who contributes content to the Professional Development Roadmap.

The goal of the Helmes Professional Development Roadmap is to support Helmes employees' efficient development by providing:

- 1) way to evaluate person's competences (skills, knowledge and experiences)
- 2) instructions for employees how competences could be improved

Role's Professional Development Roadmap consists from the Development Plans (see definition 3). Role's each employee level has Development Plan (Figure 2.4). For example, Quality Assurance role has four employee levels: Junior Tester, Tester, Senior Tester and Test Manager and each of these levels have Development Plan. See full list of roles and employee levels in Appendix 0.

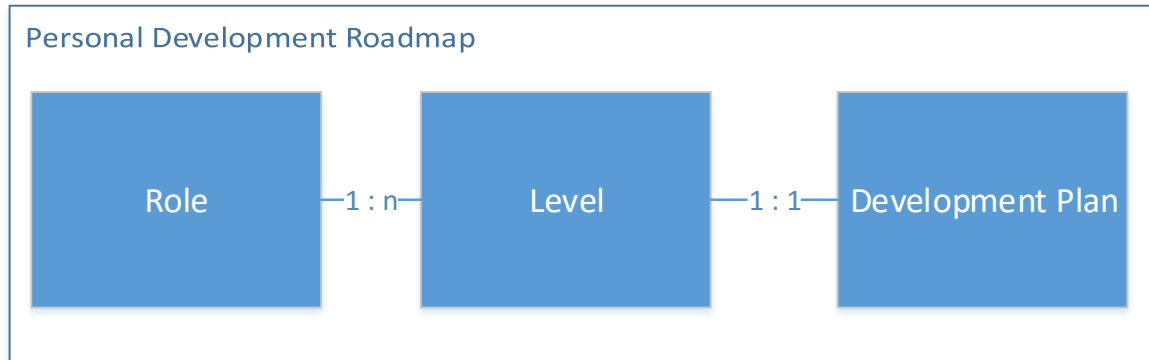


Figure 2.4 Professional Development Roadmap

Helmes has printed physical booklet of Professional Development Roadmap of the Software Developer role. The developer role has 5 levels: Junior Software Developer, Software Developer, Senior Software Developer, Lead Software Developer and Software Architect. The booklet consists of 12 pages. On the first page there is described how the booklet can be used for. From the second page, there are Development Plans.

2.3.1 Physical booklet Development Plan structure

The structure of Development Plans in the physical booklet varies (See Appendix III). Each Development Plan has topics Entry Level, Way Forward, My reading list and My trainings. See the most common Development Plan structure of Software Developer's Professional Development Roadmap booklet in Figure 2.5. Under each topic there are 3 - 12 content points (see definition 8). Content point describes concrete competence or recommendation of how to improve the competence. For example, the content point can be "Learn the basics for successful software release".

Topic	Subcategory
Entry Level	
Excellent	
Way forward	
	Participate in
	Obtain the following knowledge (principles and basic skills)
My reading list	
My trainings	

Figure 2.5 Physical booklet Professional Development Plan most common structure

In topic Entry Level there is described needed competence in order to become to the concrete level. Entry Level is used to assess the employee's level. For example, Senior Software Developer level in topic Entry Level is described that at least 3 years of practical experience in different software development project is needed.

Employee wants to feel that his/her value for the company has grown each year, but getting to the next level might take more than a year. The topic Excellent helps to achieve that. In topic Excellent it is described needed competence in order to be excellent on the concrete competence level. This allows to differentiate and recognize employees within the level.

Way forward describes how employee should improve his/her competences. There are three subcategories under Way forward: Participate in, Obtain the following knowledge and Additional suggestions. In the subcategory Participate in are described in what activities should employee participate, for example "participate in Code Review sessions". In subcategory Obtain the following knowledge describes what new knowledge should be gained, for example "Identifying performance issues". In Additional suggestions are described additional recommendations, for example "Learn alternative programming language to expand the horizon".

There are also topics My reading list and My trainings. Topic My reading list describes what books to read, for example, "Lean Software Development". My trainings describe what training to take, for example "Agile Retrospectives training".

2.3.2 Usage of Professional Development Roadmap

As the Software Developer Professional Development Roadmap it is the only Professional Development Roadmap which is currently printed on the booklet, it is the only Development Roadmap which is actively in use in Helmes. The Professional Development Roadmap is used mainly during Technical Development Discussions. The Competence Leader explains the Professional Development Roadmap content and assesses the specialist's competences according to the Professional Development Roadmap. That enables employee to understand better what competences he/she already has and what competences and how should he/she obtain. Throughout the year employee checks from the Professional Development Roadmap what he/she should do regarding his/her professional development. Also the Professional Development Roadmap is sometimes used in job interviews to map the candidates' competences during technical interview.

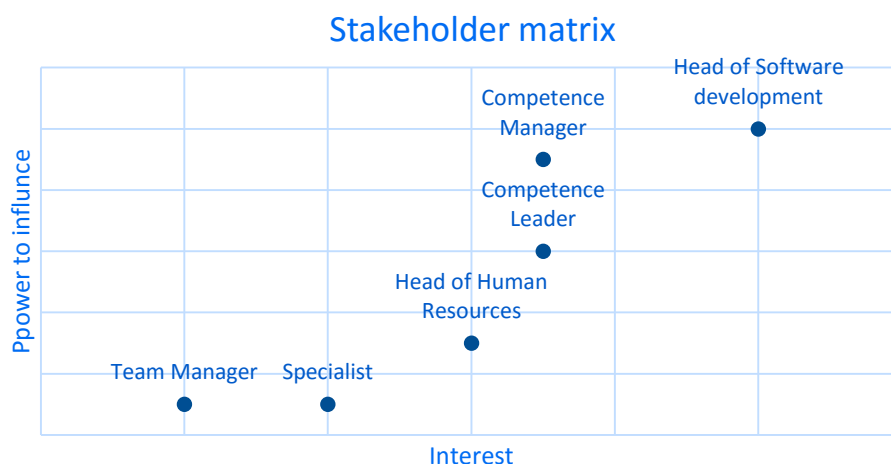


Figure 2.6 Professional Development Roadmaps Stakeholder matrix

Head of Software development is responsible of the content in Professional Development Roadmap. The Competence Managers also improves the content in the Professional Development Roadmap. Meaning Head of Software Development and Competence Managers influence the Professional Development Roadmap the most (see Figure 2.6 Professional Development Roadmaps Stakeholder matrix). Competence Leader explains the Professional Development Roadmap to specialist and assesses the specialist's competences based on the Development Roadmap. Meaning his/her interpretation of the Development Roadmap is also very important. The Team Manager and the Head of Human Resources are not directly influencing the Development Roadmap, but they are interested in the Professional Development Roadmaps existence.

3 Current state of professional development in Helmes

In this chapter Helmes professional development processes are described in detail. Understanding in detail how Helmes currently supports specialists' professional development, helps to locate problems in the current process and find opportunities how digitizing Professional Development Roadmap could improve professional development processes in Helmes.

3.1 Current state process

3.1.1 Creating Professional Development Roadmap

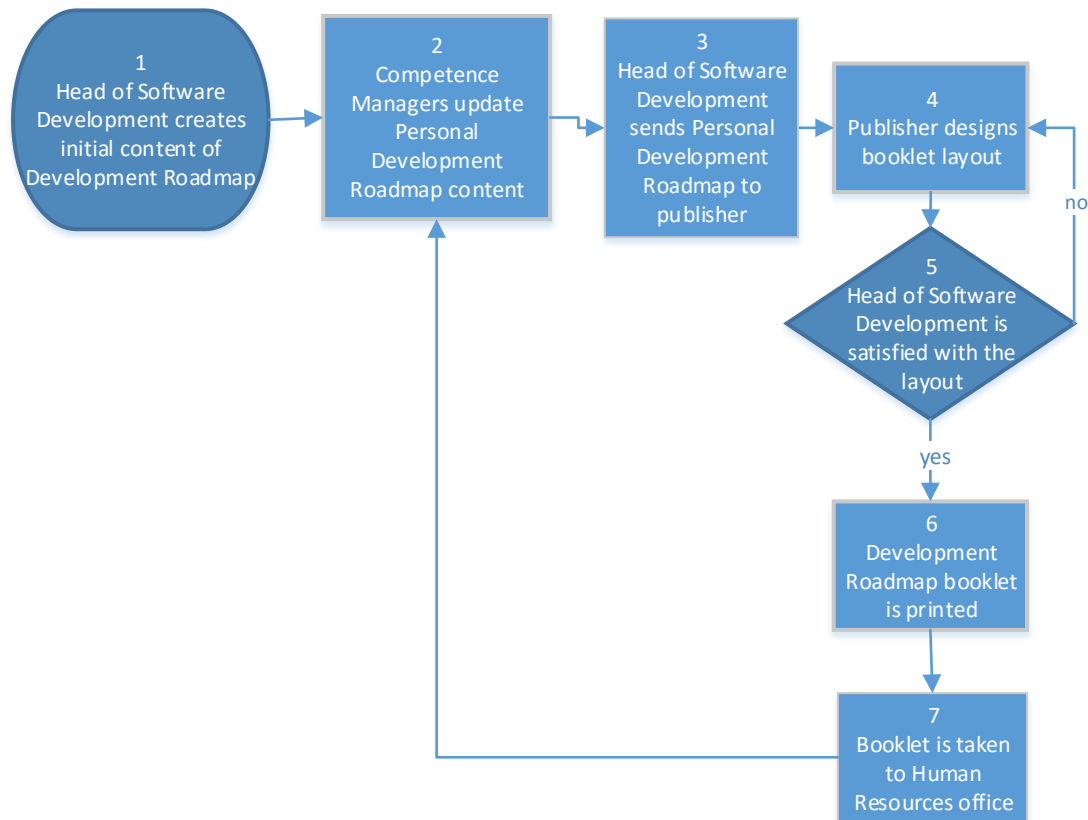


Figure 3.1 Current state process of creating Professional Development Roadmap physical booklet

Creating the Professional Development Roadmap physical booklet has six steps (Figure 3.1). First initial content is made by Head of Software Developer. Then the content is updated by Competence Managers. Then the layout is designed to fit nicely on the booklet by publisher. Head of Software Development lets to re-design the layout until he/she is satisfied with it. Then booklet goes to printing. Then the content of Professional Development Roadmaps arrives to Human Resources office. It takes around 3 months starting from putting the content together and when it actually reaches to Human Resources office. The Head of Human Resources will give the booklet to new employee on employee's first day at work in Helmes. The process of updating professional development booklet takes a lot of time and effort from the Head of Software Development, but only new employees receive new content.

The Software Developer's Professional Development Roadmap is only Professional Development Roadmap in Helmes which is already printed out to the physical booklet. Content is

also made for five other roles: Quality Assurance, IT/Business Analyst, Business Manager, Team Manager, UI/UX Designer. The other content is kept in Helmes wiki but is not actively in use.

3.1.2 Technical Development Discussion

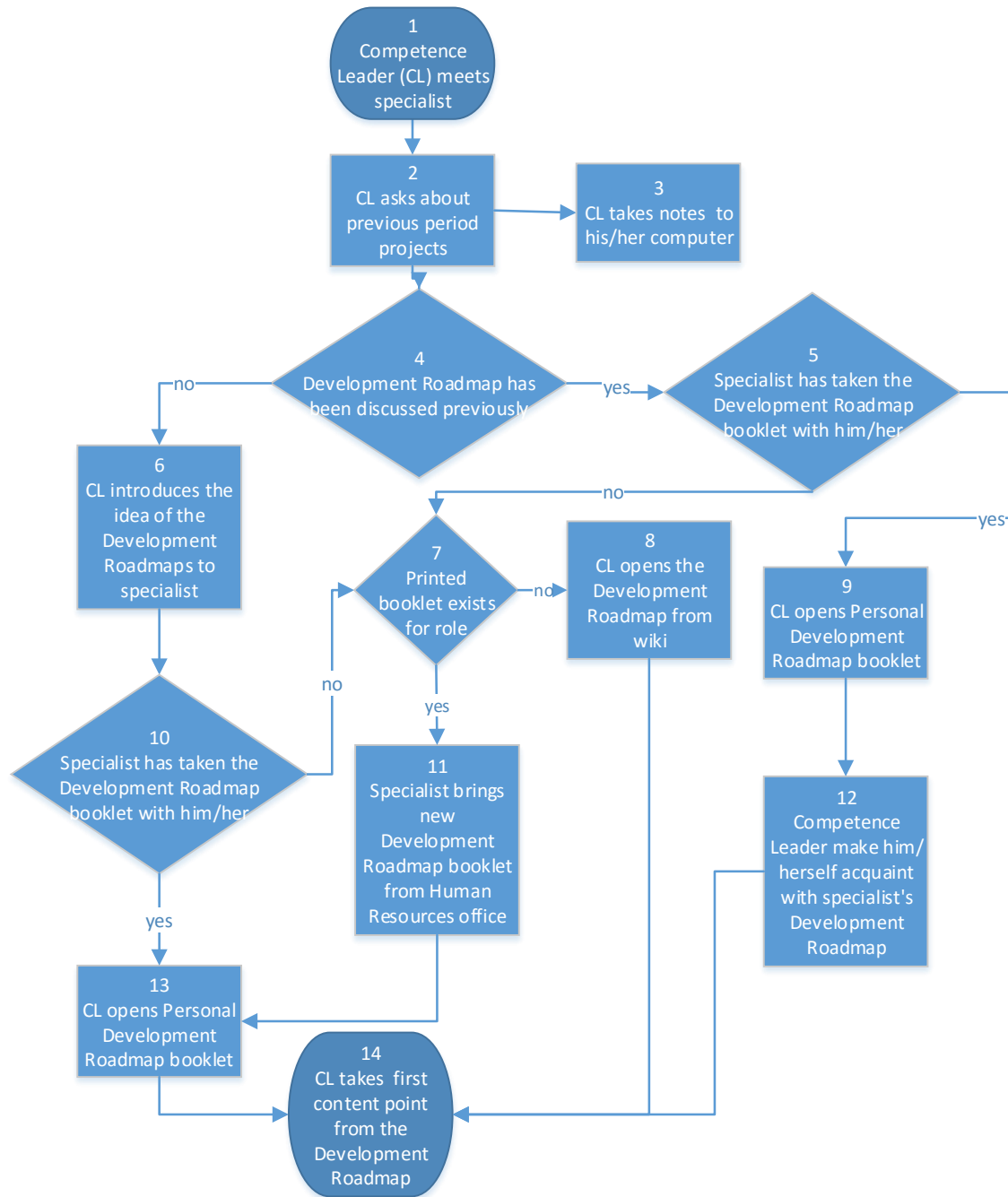


Figure 3.2 Current state process of first part of Technical Development Discussion

In Technical Development Discussion, Competence Leader discusses specialist's technical development. Usually only Competence Leader and specialist are taking part of the Technical Development Discussion. Sometimes also Team Manager joins the meeting as a spectator. The technical development discussion consists of two parts. The first part of Technical Development Discussion (see Figure 3.2) Competence Leader discusses with the specialist generally about his/her technical development in the previous projects. For example, they

talk about what projects specialist has been doing since the last meeting, what was his/her role in the projects and what he/she has learned from it etc. Competence Leader takes notes about this part to his/her computer. In the end of the first part Competence Leader prepares for discussing the Professional Development Roadmap. Competence Leader makes sure that specialist has the Professional Development Roadmap with him/her. When specialist has not taken the booklet with him/her, but the booklet exists for the role he/she will bring it from the Human Resources office. When booklet does not exist for the role, Competence Leader will open the Development Roadmap from the wiki.

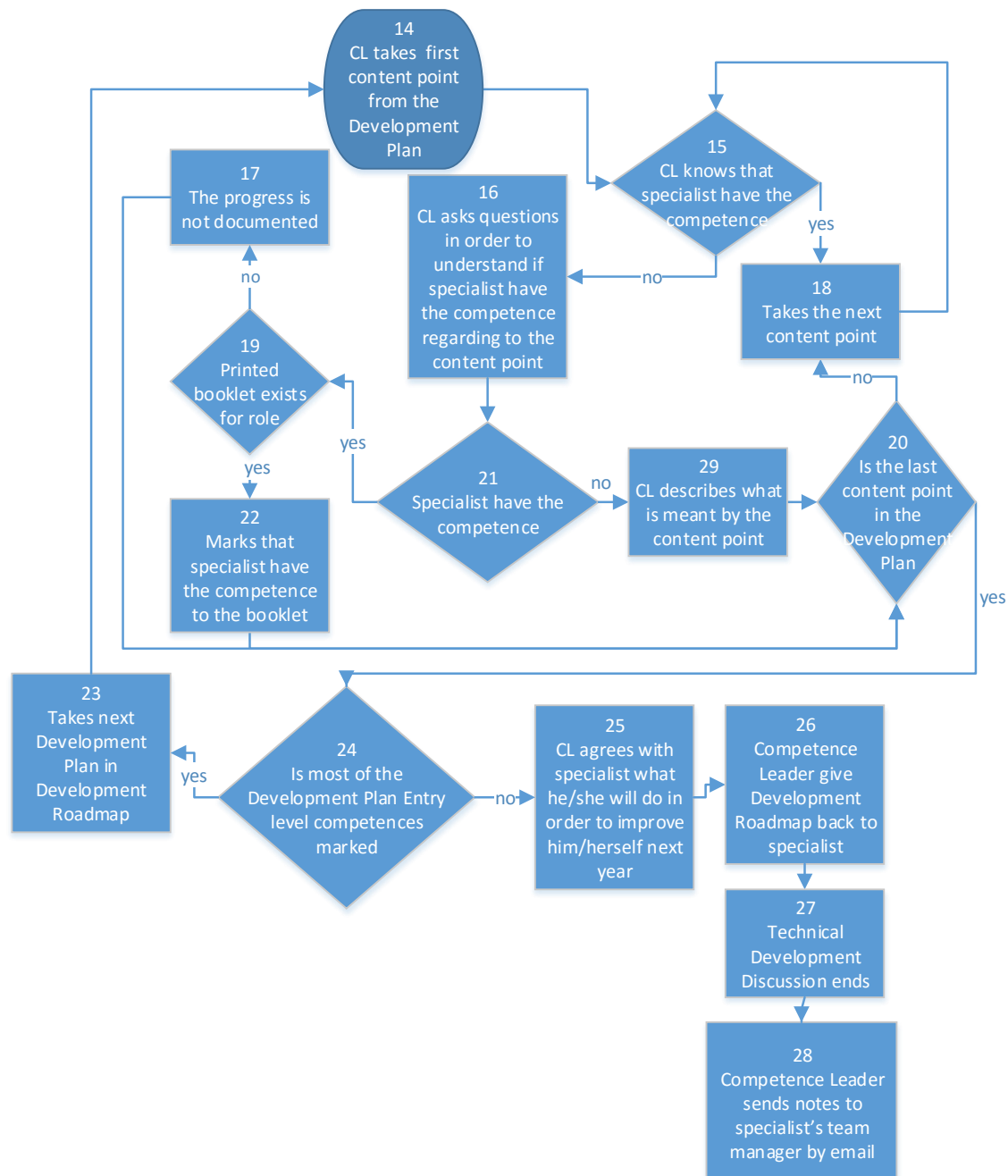


Figure 3.3 Current state process of second part of Technical Development Discussion

In the second part of Discussing Development Roadmap (see Figure 3.3) Competence Leader goes through the specialist role's Professional Development Roadmap with the specialist. The Competence Leader explains the Professional Development Roadmap content

and asks questions to assess if the specialist has the competences described in the Professional Development Roadmap. When concrete role has the booklet, the Competence Leader marks what competences specialist has to the Professional Development Roadmap booklet. When the booklet does not exist, there are not documented which competences specialist has. Competence Leader starts going through the Development Roadmap from the first Development Plan. When the specialist has most of the competences in the concrete Development Plan, Competence Leader takes the next Development Plan which requires more competences. When specialist does not have most of the required competences for concrete level, there is no point to go through the next plan, because specialist should gain the competences on the concrete level before.

3.1.3 Regular Development Discussion

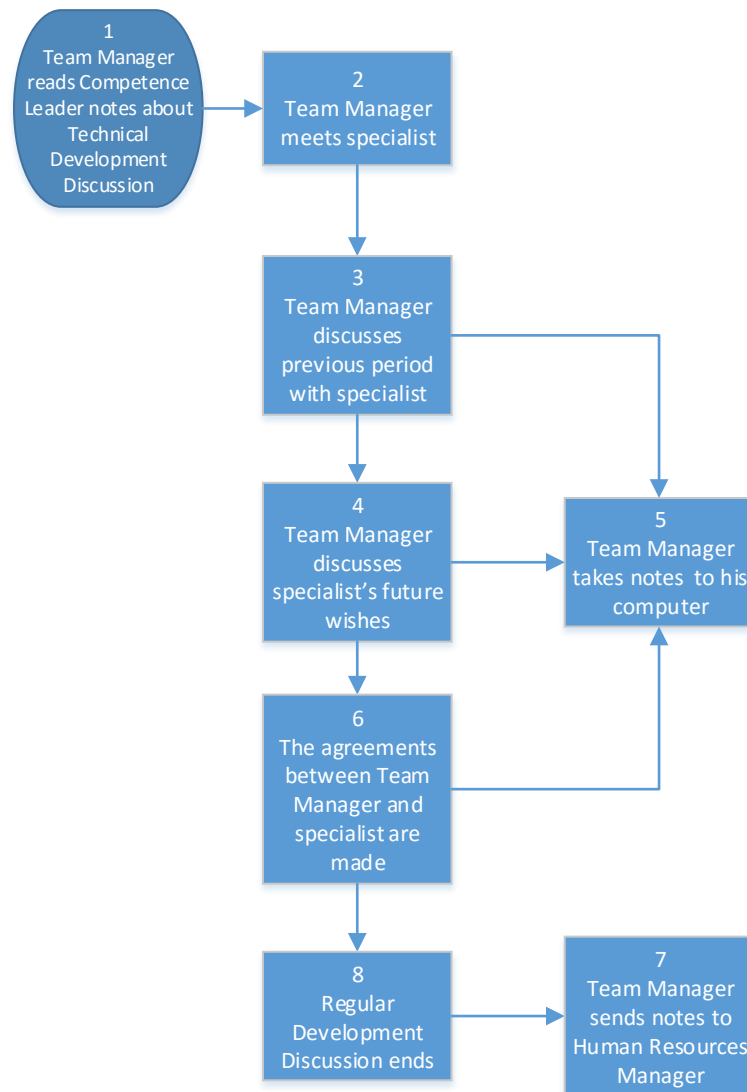


Figure 3.4 Current state process of Regular Development Discussion

Regular development discussions are carried out by Team Manager. Although regular development discussions are carried out by the Team Manager, sometimes the Head of Human Resources also attends there. For example, Head of Human Resources attends to regular development discussion when there is known that the specialist wants to change the team or there are some problems between specialist and Team Manager. Team manager takes notes to his/her computer.

Team Manager starts the development discussion by discussing what specialist has done since the last Regular Development Discussion. It includes discussing previous period specialists' work nature, the motivation of the specialist, getting along with client and team etc.

After understanding what specialist has done previously, Team Manager starts the discussion about what specialist would like to do in the future. This includes what trainings he/she would like to take, what kind of working assignments he/she would like to get more etc.

The last part in Regular Development Discussion is about making concrete agreements between specialist and Team Manager. For example, to what trainings the specialist will go, what kind of working assignments will he/she be getting etc. Also when needed salary size will be overlooked here.

3.1.4 Specialist improves him/herself using Professional Development Roadmap

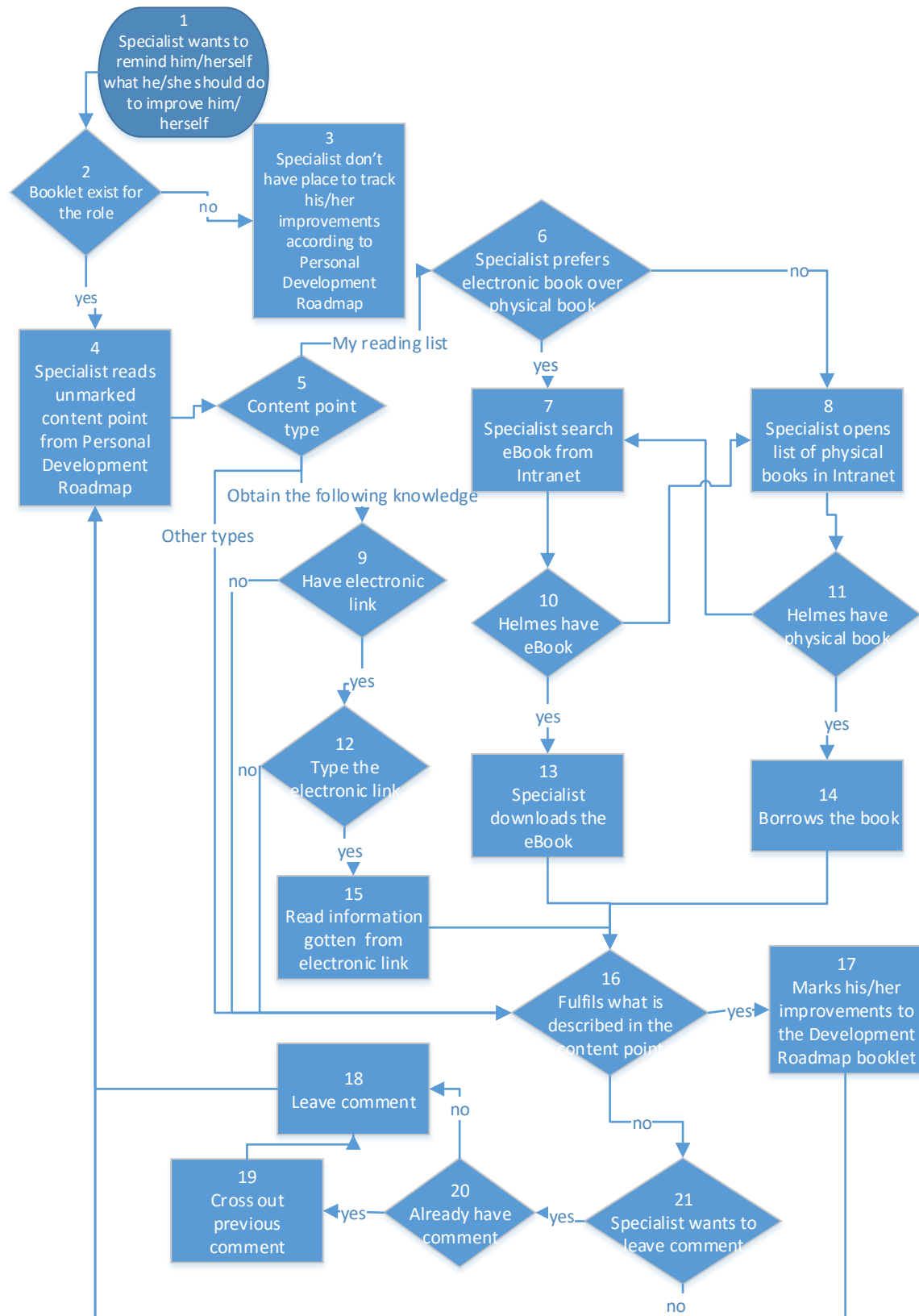


Figure 3.5 Current state process of specialist improves him/herself using Professional Development Roadmap

When the role has a Professional Development Roadmap, the specialist in the role can use it to get concrete professional development improvement recommendations throughout the year. Helmes has all the books that are described in the Professional Development Roadmaps. The book can either be physical or/and eBook. Depending on specialist preferences, he/she chooses the suitable/available form of book. Some of the type ‘Obtain the following knowledge’ content points have electronic links. When specialist wants to open the links, he/she will retype in order to open it. If specialist thinks that he/she has fulfilled what is described in the content point, he/she marks the point in the booklet. If specialist wants to comment his/her improvements regarding to the Professional Development Roadmap, he/she can write it to the booklet. If there are any previous comments regarding the content point, he/she strikes through the previous comment.

3.2 Problem analyses

The goal is to locate and analyse which problems should be solved while digitizing Helmes Professional Development Roadmap. Firstly, the problems are listed based on the current state process models. If there is any problem regarding to process model item, it is listed in the chapter 3.2.1. Then the problems are grouped and the main problems are described in chapter 3.2.2.

3.2.1 List of problems in current state

In this chapter, there are listed the problems regarding current process which was described in chapter Figure 2.6. The problems are listed in the Table 1, Table 2, Table 3 and Table 4.

Table 1 Problems regarding to creating the booklet

Figure 3.1 item id	Problem related to flowchart item
3	Communication with publisher wastes Head of Software Developer’s time
4	Designing the booklet costs and takes time
5	Head of Software Development must waste time with communicating with publisher
6	Printed booklet can be updated only by reprinting the booklet
7	Booklet reaches to the HR office where only new employees will get it (current employees will not receive it)

Table 2 Problems regarding to Technical Development Discussions

Figure 3.2 and Figure 3.3 item id	Problem related to flowchart item
7	If specialist loses the booklet the data in the Development Roadmap may get in hands of someone who should not have it If specialist have left booklet at home, Competence Leader must start from the beginning of mapping the specialist's competences although there might be some work done previously (inefficiency)
8	When the booklet does not exist for the role, there is no good place to mark the progress

11	Waste of booklets (each booklet costs)
12	The notes may not be clearly understandable which may cause misunderstanding
16	The questions what Competence Leader ask may differ and therefore the assessment if person have the competence may also be different
17	When there is no documentation of development process, then every year should start from the beginning or rely on the memory what competences were already acquired
19	All the specialist roles should be treated equally
22	The option is if they have the competence or not, but there should be more statuses
25	The agreements are not documented
29	There should be more information which would help to describe what is meant by the content point

Table 3 Problems regarding to Regular Development Discussion

Figure 3.4 item id	Problem related to flowchart item
3	Team manager does not have good overview about specialist's technical development in previous period

Table 4 Problems regarding to how specialist improves him/herself using Professional Development Roadmap

Figure 3.5 item id	Problem related to flowchart item
3	Each specialist in Helmes should know clearly where he/she can get the recommendations to improve him/herself
4	There is not much information for content point
7	Specialist has to open different environment to find the eBook which is inconvenient
8	Specialist has to open different environment to find the physical book which is inconvenient
12	Electronic link is inconvenient to retype to browser as the link may be quite long
13	Finding and downloading the eBook is too inconvenient as it needs separate multiple steps including opening the second environment
17	Improvements in Personal Development Roadmaps is only seen by specialist, not by the Team Manager or Competence Manager
18	There is not much space for leaving the comment. Multiple comments starts interfering each other as space for comments are very limited.
19	Striking through previous comments makes the booklet messy and getting the overview becomes more difficult

3.2.2 Main problems regarding to Professional Development Roadmap booklet

There three main problems regarding to physical booklet are:

- 1) Updating the content in the Professional Development Roadmap is difficult and ineffective
 - a. The updated content will reach to new employees only
 - b. Updating process takes too much time and effort from Head of Software Development
- 2) Tracking specialist's professional development has a low transparency
 - a. Team Manager and Competence Leader do not have an overview of specialist's Professional Development improvements throughout the year
 - b. Feedback from Competence Leader to Employee can't be documented very well
- 3) Booklet is inconvenient to use
 - a. Specialist must remember to carry the booklet around
 - b. Electronic links are uncomfortable to use

The biggest problem regarding to the physical booklet is that updating Personal Development Roadmaps is difficult and ineffective. Updating the content takes too much time and effort from Head of Software Development. When the booklet is given out to employees and some content should be updated, the only way to update the content is to print out the new booklet and then manually transfer the progress from one booklet to the new one. Manually transferring the progress from one booklet to a new one is too uncomfortable and is not done. It means that only new employees will get the new version of the booklet, meaning most of the employees have the outdated Professional Development Roadmap booklet. There is need to update the Professional Development Roadmap often: new needed competences arise and better learning materials appear. For example, Software Developer Development Roadmap is significantly updated since last print of the physical Development Roadmap booklet.

The second problem is regarding to the tracking specialist's professional development. There is very little transparency of specialists' professional development. Specialist is the only one who is able to have clear overview of how he/she is doing regarding to the filling of a Professional Development Roadmap. Competence Leader and Team Manager are also interested to have the information about specialist's professional development. The Competence Leader and Team Manager cannot have current overview of how his/her employees are doing regarding to self-development, because the booklet with the information is accessible by specialist only. Also the feedback from Competence Leader to Employee can't be documented very well as the physical booklet does not have space for good documentation. It is difficult to do changes to the documentation in the booklet, because it will get messy after striking through previous comments.

The third problem is that form of booklet is inconvenient to use. Specialist has to carry the booklet around and remember where he/she keeps it. Specialist may forget to take the booklet with him/her to Technical Development Discussion. The Competence Leader must start mapping specialist's competences from beginning then. Also specialist can lose the booklet. Losing the booklet means that unauthorized people can find it and take advantage of the info inside there. The links to web learning materials are not linkable. This means that employees have to retype the links which is very inconvenient. The same problem is with eBook links. Helmes has most of the books described in My reading list available in eBook form in the Intranet. Currently employees have to manually search the eBook, because physical booklet does not enable to link it.

4 Target state of professional development in Helmes

In this chapter is described the target state of professional development processes.

4.1 Target state models

4.1.1 Creating Professional Development Roadmap

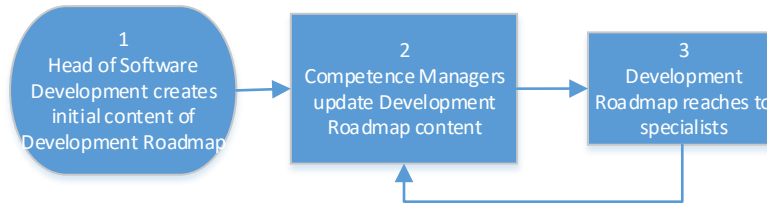


Figure 4.1 Target state process of creating Professional Development Roadmap

In the target state there should be an application which enables to update the Development Roadmap in a way that updated content will reach to the current specialists' Professional Development Roadmap right away. When new person will come to work to Helmes, he/she also gets the most up-to-date version of Professional Development Roadmap. Meaning that all the employees are on the latest version of Professional Development Roadmaps. There will not be any direct costs related to updating the content in Professional Development Roadmaps.

4.1.2 Technical Development Discussion

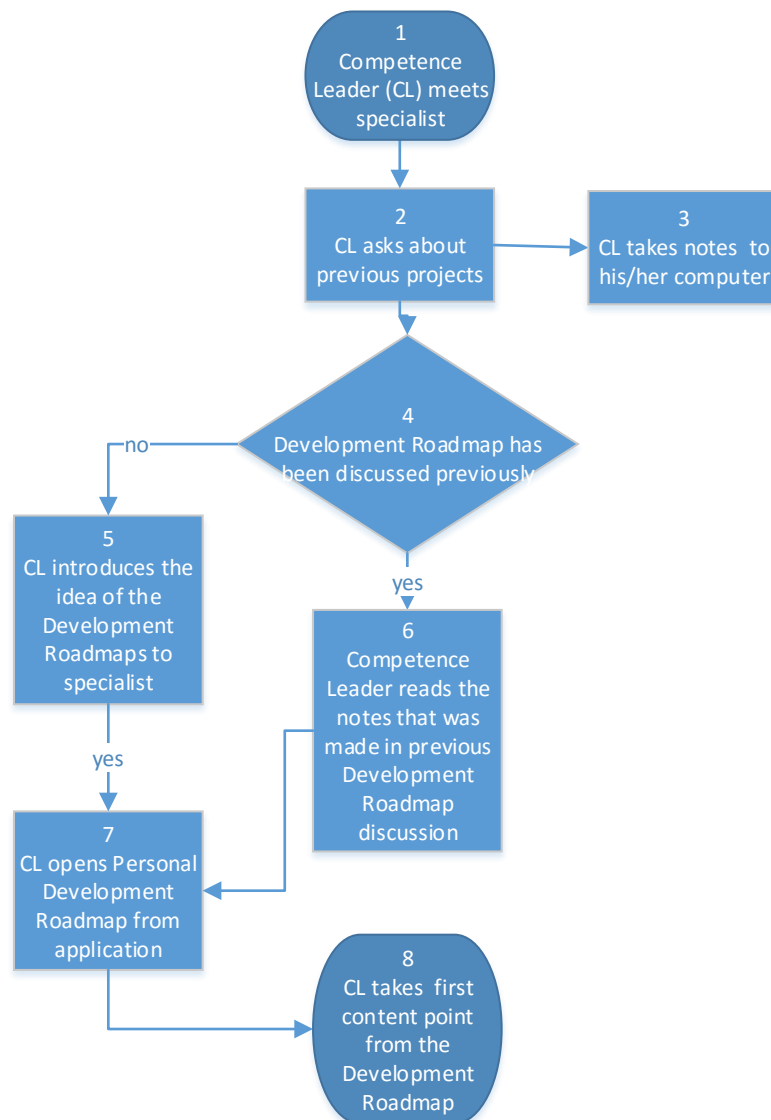


Figure 4.2 Target state process of first part of Technical Development Discussion

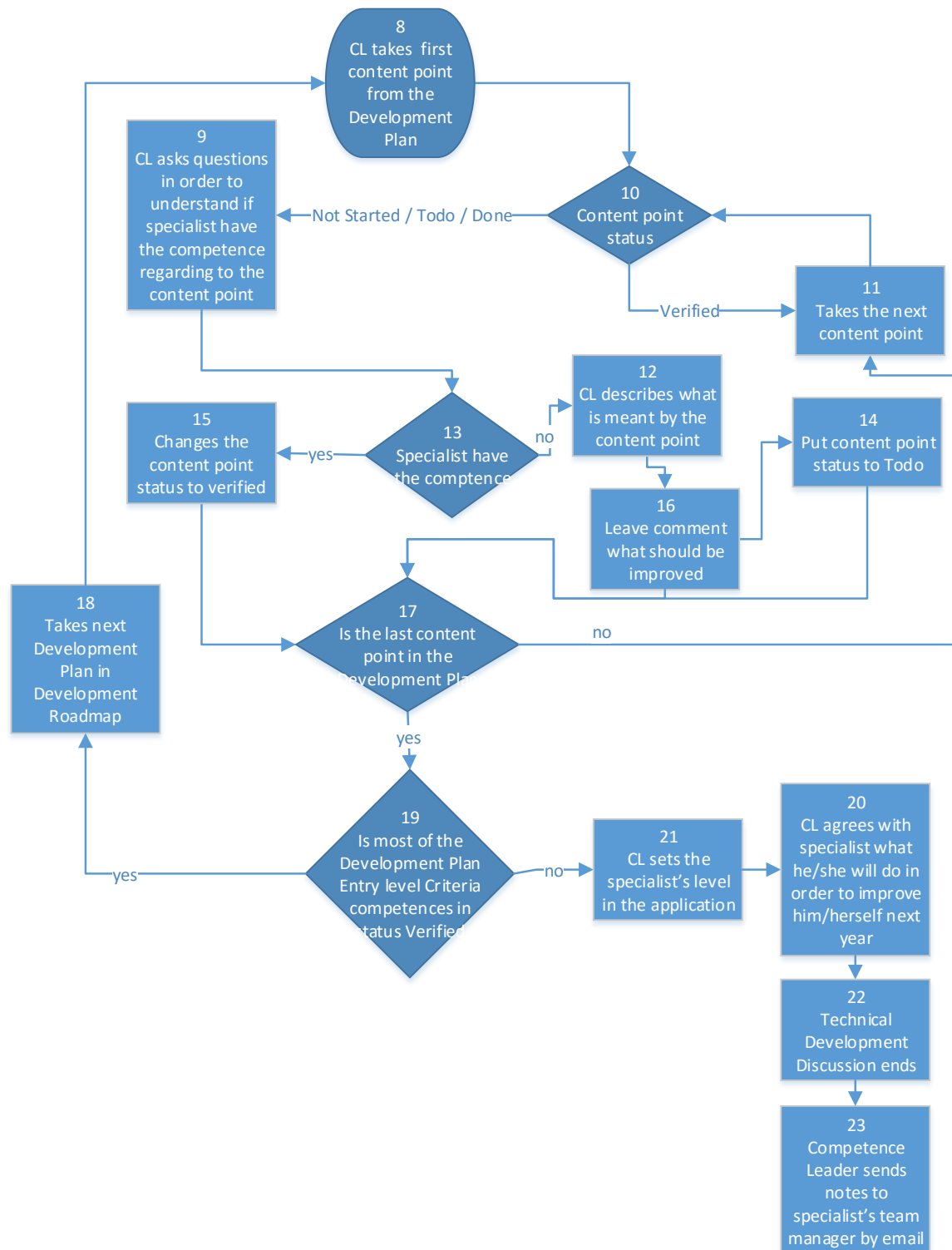


Figure 4.3 Target state process of second part of Technical Development Discussion

In the target state (see Figure 4.2 and Figure 4.3) the role's Development Roadmaps are all in one application. Specialist cannot forget and lose the Development Roadmap to somewhere, so the information will not get lost and only authorized people can access the Professional Development Roadmaps. All the Development Roadmaps are in one place, accessible by all the employees and employees can mark the progress to Development Roadmaps.

Each content point can be in 4 statuses: Not Started, To-do, Done and Verified. Not started is the initial status of the content point. Competence Leader puts the content point to status To-do when the specialist does not have the competence, but should obtain it within a year. Competence Leader puts the content point to status verified when Competence Leader has understood that the specialist has the competence. In the end of the Technical Development Discussion, Competence Leader sets the level of the specialist in the application. There are no misunderstandings due to the format of the comments.

4.1.3 Regular Development Discussion

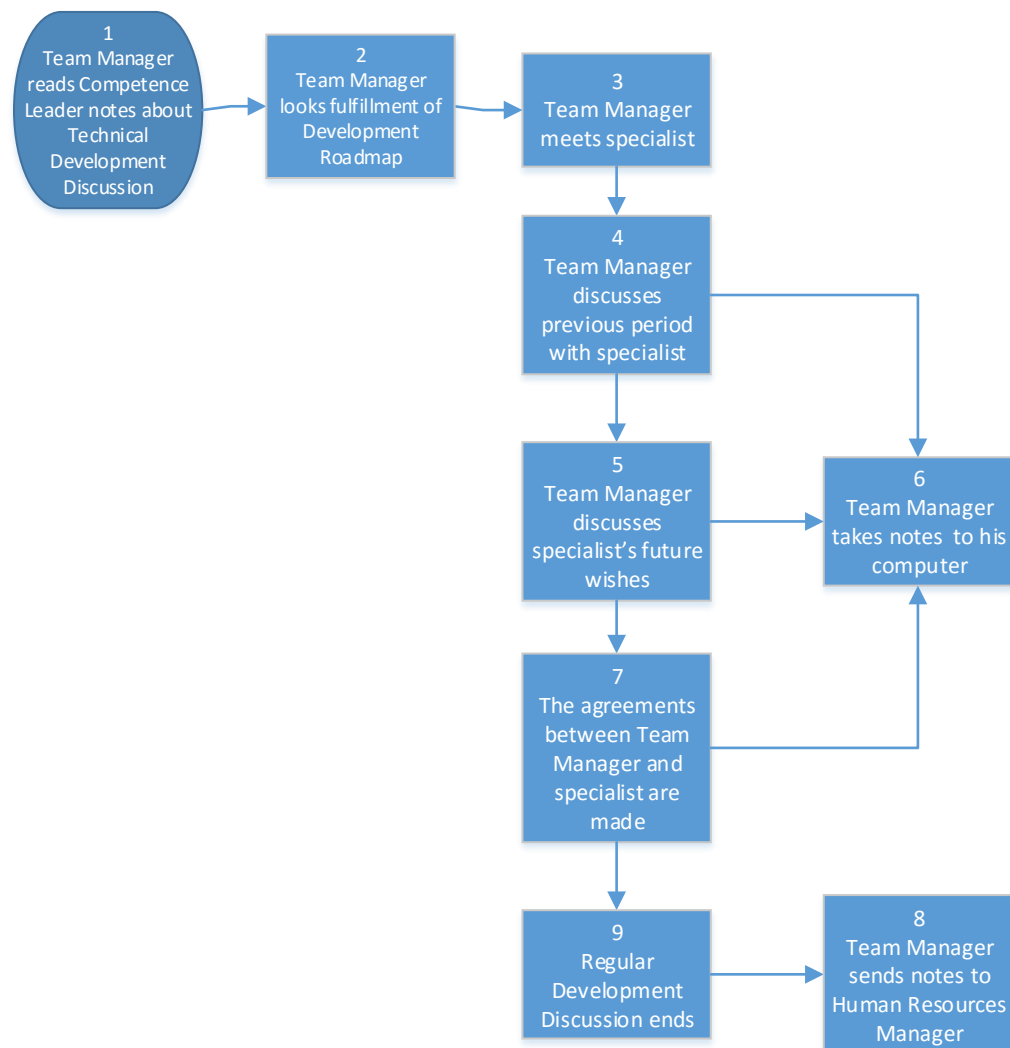


Figure 4.4 Target state process of Regular Development Discussion

In the target state (see Figure 4.4) before regular Development Discussion Team Manager will look from the application how specialist has developed him/herself according to the Development Roadmap. This gives better understanding for Team Leader of specialist's professional development.

4.1.4 Specialist improves him/herself using Professional Development Roadmap

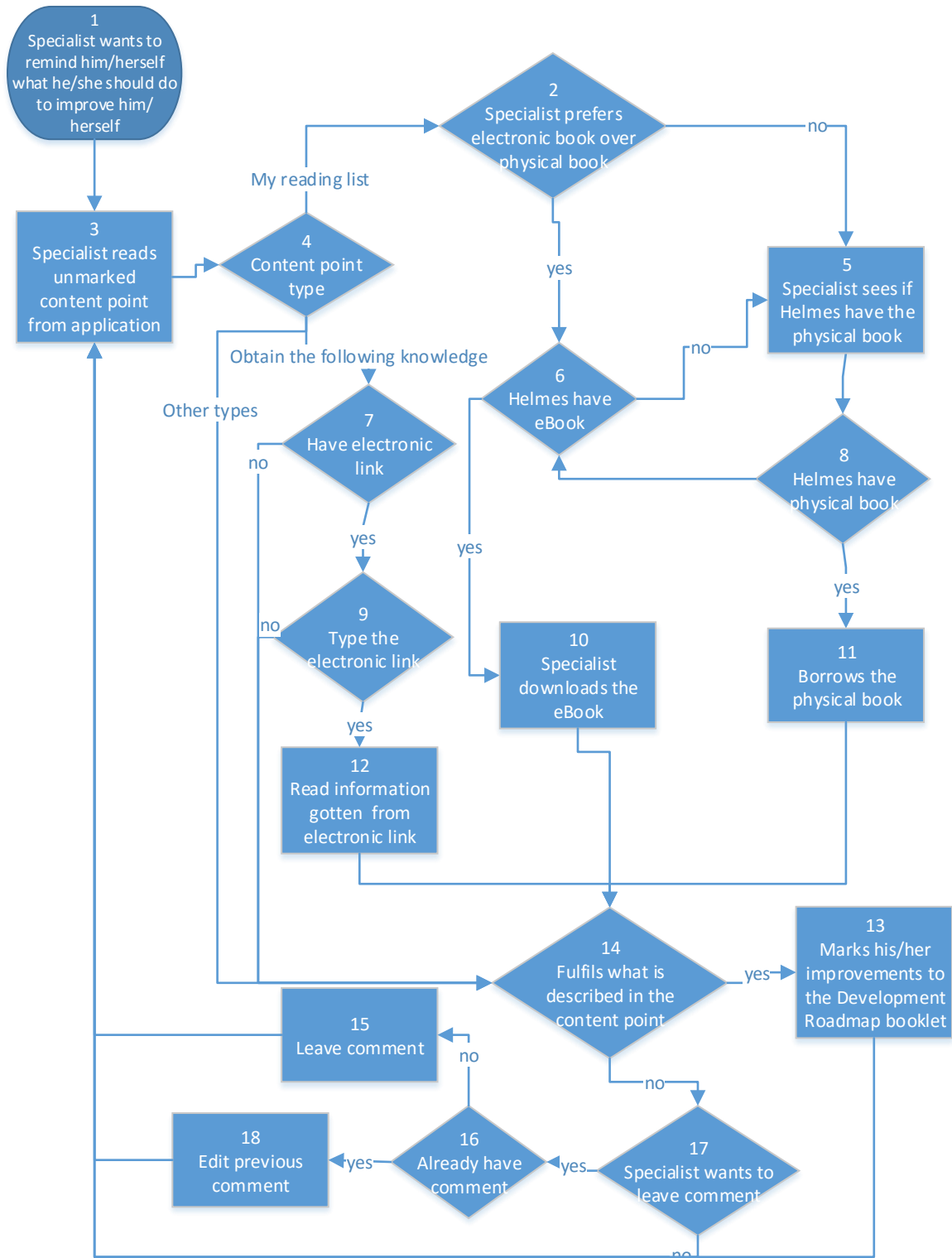


Figure 4.5 Target state process of specialist improves him/herself using Professional Development Roadmap

In the target state (see Figure 4.5), every specialist can access the Professional Development Roadmap, where they can also track their professional development. The progress of fulfilling the Development Roadmap can be accessed by specialists' Competence Leader and

Team Manager. The application should allow to have more information about the content point in a way that the Roadmap is still easily readable. The electronic materials should be easily accessible. Leaving and editing comments regarding to each content point should be clear and easy.

4.2 Additional benefits of digitizing Professional Development Roadmap

Additionally, digitizing Professional Development Roadmap should:

- 1) Gather data for further analyses
- 2) Allow to display additional information in the content points

When the Professional Development Roadmaps are in digital form it enables to gather data how employees have improved their competences throughout years. The data can be used for different analyses in the future. For example, when Helmes want to have way to analyse how employees' have improved themselves through years in different business units, the data gathered in the new application should enable that.

In the physical booklet the amount of information that can be conveniently showed was quite limited, because the overview of the content points must stay easily readable. In the digitized Professional Development Roadmap there could be some information hidden at first. So the information which is hidden at first, can consist a lot of information without interfering having clear overview of the content points. For example, there could be added assessment questions which would help specialist to self-evaluate his/her competences. In the additional information there could also be interactive learning materials, for example video trainings.

4.3 Application requirements

4.3.1 Non-functional requirements

1. Users must be able to authenticate him/herself with Helmes corporate account (Microsoft Active Directory account)
2. Application must be usable in latest Chrome browser
3. 30 users must be able to use the application simultaneously
4. The application must response to all the queries within 10 seconds

4.3.2 Functional requirements

There are three main areas of functionalities that application should provide:

- Track progress in Professional Development Roadmap
- Manage Development Roadmap
- Central user rights management

The functional requirements are described in user stories.

4.3.2.1 *Track progress in Professional Development Roadmap user stories*

1. As an employee, I can see Professional Development plan content points so I would know what I need to do to become the next level employee.
2. As an employee, I can mark which Professional Development plan content points I have done so I could have a good overview which points I have completed and what needs to be done.

3. As a Competence Leader, I can see my each employee content point statuses so I could encourage my employees for professional development.
4. As an employee, I can plan achieving the content point so my Competence Leader and Manager would know when I am planning do certain development points.
5. As a Competence Leader, I can verify/reject employee's development plan resolved points so employee and employee's Manager could get feedback for the development.
6. As a Team Manager, I can see my each employee's content point statuses so I could encourage my employees for professional development.
7. As a Competence Leader, I can manage employee's current level so specialist and his/her team manager would know, how specialist's abilities are currently evaluated.
8. As an employee, I can comment on concrete Development plan point so it would be clearer for me, my Competence Leader and Manager would know how I am doing with the concrete content point.
9. As an employee, I can add personal content (see definition 10) points so my professional development would be noticed by Manager and Competence Leader even if the points are not in my Professional Development Roadmap.
10. As a Competence Leader, I can comment my employees' development plan fulfilments so employee and employee's Manager could get feedback for his/her professional development.
11. As an employee, I can filter content points according to content point status so I could see only the points that I am interested in.
12. As a Competence Leader, I can add personal content points for my employee's, so my employee sees what he/she should do even if it is not exactly the same as other same role and level employees.

4.3.2.2 *Manage Development Roadmaps user stories*

1. As a Competence Manager, I can add content points to development plans so development plans would be high quality and up-to-date.
2. As a Competence Manager, I can manage development plan content so development plans would be high quality and up-to-date.

4.3.2.3 *Central user rights management user stories*

1. As a Head of Software Development, I can manage users' roles so everyone could access just as much information as they need.
2. As a Head of Software Development I can assign Competence Leaders to employees so employees would get quality feedback in a specific technology field.
3. As a Head of Human Recourses, I can assign Manager to employee so all the Managers would see (only) his/her employees.
4. As a Head of Software Development, I can see lists of employees who have (not) been assigned Managers and Competence Leaders so I could know who I could assign these to them.

5 Delivering the application

In this chapter, it is described what alternative ways were considered to deliver the solution, how the application was developed and how the built application was tested with alpha users.

5.1 Alternative ways to achieve the target state

The Professional Development Roadmap could be digitized by finding suitable ready product or develop a custom application. Author of the thesis considered two ready products for digitizing Professional Development Roadmaps: Halogen TalentSpace and Instancy Competency Management.

Halogen TalentSpace is a talent management solution. Halogen TalentSpace is a performance focused on learning solution, which connects with on-the-job learning, continuous coaching and formal learning activities [23]. The system cannot be used in Estonia territory due to the Halogen company policies, which means it is not a suitable solution.

Instancy Competency Management System allows to build a database of job roles and required competences and skill levels. The system allows to automate and personalize learning plans for each learner. [24] The system costs 2\$ per active user per month with minimum of 100 users [25]. The system does not allow to use Helmes corporate account to authenticate employees. The ready product's applications that were reviewed were not enough suitable for digitizing Helmes Development Roadmaps so it is decided to build a custom application.

Helmes has one custom software which could be enhanced to fulfil the needs of digitizing Helmes Development Roadmap. That system is currently used to have a central database of all the projects and employees' *Curricula Vitae*. The reputation of the system among employees is not good as the system has inconvenient user interface and quite many software faults. As the current custom system, what could be enhanced, has a bad reputation among the employees, the system should not be enhanced to achieve the target state. So it is wise to build new custom application. Also building a new custom application enables to develop the project in the Helmes Summer Bootcamp. Below are described the benefits of developing the application in the Bootcamp.

Considered ways to build custom application:

- 1) Build application in the Bootcamp
- 2) Outsource the development
- 3) Recruit experienced development team

Helmes Summer Bootcamp is a summer university program which teaches agile software development methodologies for participants by developing real software projects [26]. The main goal of the Bootcamp is to find suitable employees for Helmes and prepare them to work in Helmes. Helmes wants to give junior developers the experience of building real software projects using Scrum framework. To provide wide (starting from planning the architecture) Scrum experience for participants, Helmes has decided that the project must be developed from scratch.

As the Bootcamp is happening regardless if the Professional Development Roadmaps application is developed in the Bootcamp or not, the expenses regarding to the Bootcamp is done anyway. From the cost perspective, developing the solution in the Bootcamp is the best solution comparing to outsourcing the development or recruiting experienced development team. Bootcamp participants are not experienced developers and there is a risk of hav-

ing quality problems with the application. This risk is reduced by experienced mentors supervising junior developers. From risk perspective, it would be less risky to recruit experienced development team or outsourcing the development to high quality development partners. As the direct cost of developing the system in Bootcamp is zero (the program would be carried out anyway for recruiting purposes) then the small expense outweighs the quality problems risk.

Due to the reasons:

- Well-suitable ready product for digitizing Professional Development Roadmap is not available
- There is no well-suitable custom application to enhance in Helmes
- Building an application in the Helmes Summer Bootcamp is cost effective

it is decided to build new custom application in Helmes Summer Bootcamp.

5.2 The development of the application

The Helmes Professional Development Roadmap software development started in August 2015. The system was developed using Scrum framework in Helmes Summer Bootcamp. The author of the current thesis was in Product Owner's role. Five bootcamp participants were the Development Team and Raul Ennus was a Scrum Master. Also there were two experienced software developers (Helmes employees) and an analyst mentoring the team.

After the Helmes Summer Bootcamp, two full time junior developers (who participated in Helmes Summer Bootcamp) continued the development in October 2015. Then the author of the thesis was additionally in project manager role. In November 2015, one full time junior developer continued the development. Bug fixing was done in December 2015.

The system was developed using Scrum framework. The development was divided into Sprints which lasted a week. In the beginning of each sprint, there was a sprint planning. In the sprint planning, Product Owner introduced the user stories (see initial user stories in chapter 4.3.2), then the team discussed the details about user stories and the user stories were estimated. The estimation was given using story points via planning poker.

After every sprint, there was a Sprint Demo. Product Owner included the most important stakeholders there: Head of Software Development and at least one Competence Manager. The feedback gotten from the stakeholders was considered in the next sprint planning.

The development day started at 09:30 with Daily Scrum. In Daily Scrum, each member said what he/she was doing yesterday, what obstacles does he/she have and what he/she will be doing on current day. After each sprint there was a Sprint Retrospective, which was carried out by the Scrum Master. In sprint retrospective, each team member said, what in his/her opinion went well and what should be improved.

5.3 Alpha users' program

After 7 sprints of development, Alpha users group were gathered. The alpha users program purpose was to test the system, gather feedback for future developments and understand if the system is good enough to introduce it to the larger audience. The alpha users program lasted for one week and consisted of 5 stages (see Figure 5.1). The alpha users group consisted of 8 Helmes' employees: 5 developers and 3 analysts.



Figure 5.1 The alpha users' program

Firstly, alpha users attended to Introduction meeting. Introduction meeting's aim was to provide background information about Development Roadmaps and to introduce alpha user's program to alpha users. More precisely, there was described to alpha users what are Professional Development Roadmaps, why Development Roadmaps are needed, who has been developing the new system and how does the alpha usage program look like. The next thing alpha users did was that they filled the pre-questioner. The aim was to understand alpha users background regarding to Professional Development Roadmap. There were asked 7 questions (see Appendix VII).

The main thing that alpha users were asked to do was to fill their Development Roadmap in the new application. While filling the Development Plans, the alpha users were asked to make a screen video recording and also comment what they were doing and feeling using their voice. That enabled author of the thesis to analyse what the users were exactly doing, how they were doing it and how system acted.

In the after questioner, there were asked generally about the system and about how the alpha users program was conducted (see Appendix VIII). In the conclusion meeting the results of the survey were presented to the alpha users. Also, alpha users were able to discuss the application face-to-face with each other and with the Product Owner.

Every participant found that the development plans are necessary and good. All of the software developers in alpha users' program had contacts with Development Roadmap booklet and they felt that they knew the Helmes Development Roadmap above average. Most of the alpha users were used to fill the Development Plan in the free time at home. They liked about the Development Roadmap that the content is easily readable and understandable. Alpha users liked least about the current booklet that it is difficult to make changes to the information in booklet as it gets too messy after making the changes. Alpha users brought out that when the information about specialist's development progress from Development Roadmap is accessible to the Team Leaders, then it would feel more important to fill the Development Roadmap.

From the recordings of the alpha usage videos, some bugs came out that the system had, which were fixed afterwards. For example, top and the bottom navigation dropdowns did not work well together (they were out of sync). Also bugs about filtering, leaving comments and personal points appeared. Most of the alpha users said that the system was almost ready to go wider usage, but the bugs should be fixed before.

6 Results

There was written web an application, which solved the main problems of the Professional Development Roadmap booklets. The entrenchment of application in the organization has started, although it takes time as technical development discussions take place only once a year.

6.1 Application overview

This web application is written in C#, JavaScript, CSS, HTML. It uses MSSQL database (see the database model in Appendix IV). It uses ASP .net MVC4 framework. The application is accessible from Helmes internal network. Helmes has professional development roadmaps accessible for following employees' roles: Software Developer, Quality Assurance, IT/Business Analyst, Business Manager, Team Manager, UI/UX Designer, DevOps described in one system (see the full list of roles and levels in Appendix IX).

6.1.1 Development Plan structure

The structure of the Development Plan has changed during the digitizing of Professional Development Roadmaps. There are three parts in a development plan (Figure 6.1): „Description”, “Entry Level Criteria” and “Way forward”. In the description there are described employee level responsibilities.

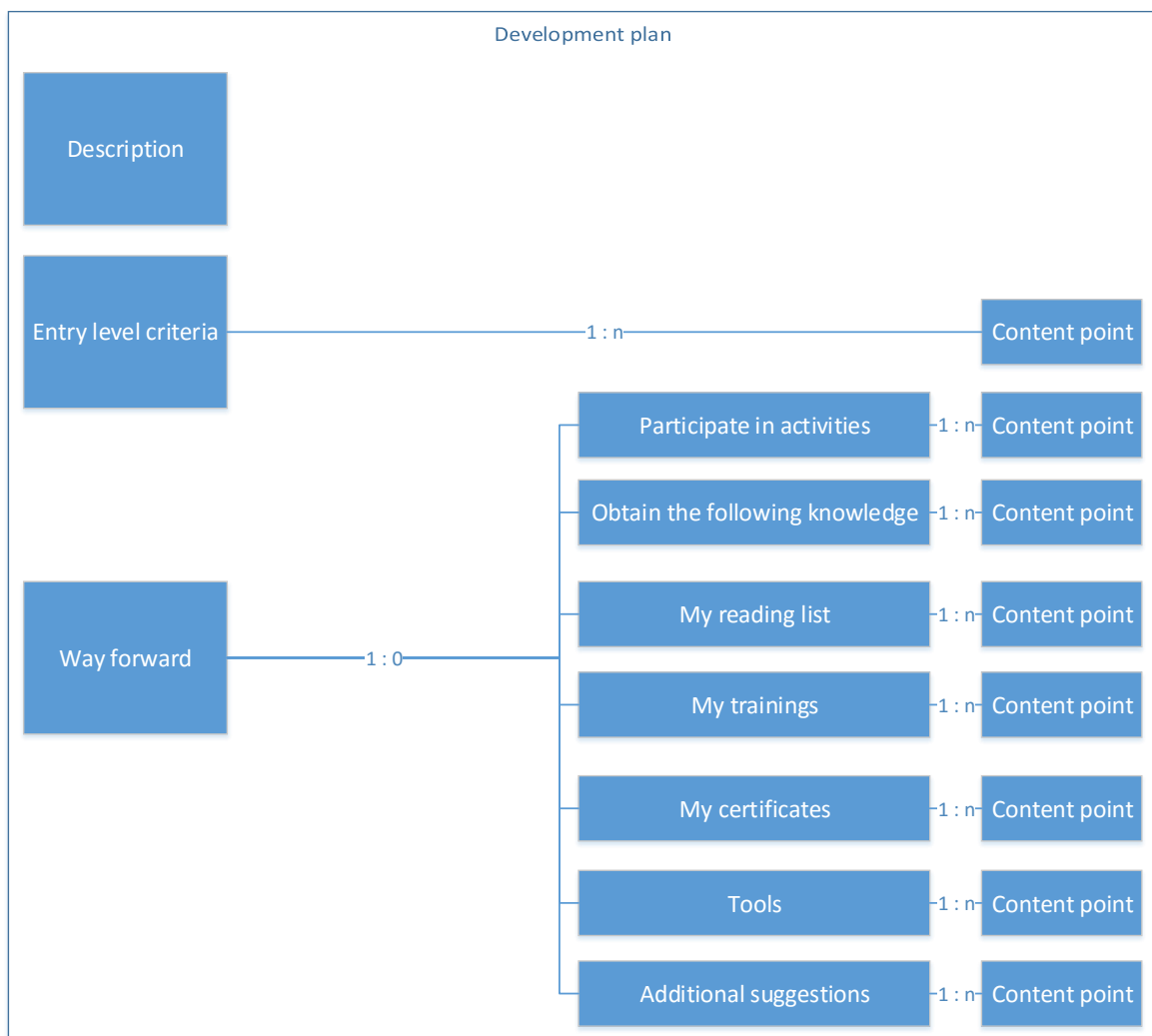


Figure 6.1 Development plan structure

Entry Level Criteria describes needed competence in order to become to the level. When previously there were two topics, Excellent and Entry Level, which described the needed competences, then now there is only one topic: Entry Level Criteria. When the topic Excellent existed in the level, the level was divided into two levels. For example, when previously there was a level Senior Software developer, which had Entry Level and Excellent described. Now there is two levels Senior Software Developer 1 and Senior Software Developer 2 which both have only Entry Level Criteria. Having separate levels was not reasonable in the booklet as this would have consumed too much space, but in digitized Professional Development Roadmap application space consuming is not an issue. This change made the Professional Development Roadmap more understandable and clear.

“Way Forward” describes how employee should improve his/her competences. There are 8 topics under “Way forward”, although every development plan may not have all the topics covered. The topics are: “Participate in activities”, “Obtain the following knowledge”, “My reading list”, “My trainings”, “My certificates”, “Tools”, “Additional suggestions”. For example, in one content point in Junior Software Developer development plan under the topic “Obtain the following knowledge” is described that the knowledge about database design (tables, primary key, foreign key, relationships, indexes) must be obtained.

6.1.2 Functionalities

The Helmes Professional Development Roadmaps system enable to:

- see Professional Development Plans
- manage Professional Development Plans
- keep track of employees’ professional development
- manage user rights

See the full feature list in Appendix V. There are five groups of users in Professional Development Plan system: Anonymous, Regular user, Leader, Competence Manager and Admin. See the full list of usage rights in Appendix VI.

Only thing that anonymous user can do is to authenticate him/herself. The authentication is implemented via Helmes Active directory. Meaning that employees have the same username and password for this application as in other internal systems. When person changes the password in one application the password is changed in all internal applications (including Professional Development Roadmap system).

Regular user can see all the roles’ Development Roadmaps. Regular user can see which level he/she currently is. Leader can set the level of employees who is assigned to him/her. Regular user and Leader can choose to see role’s concrete level development plan or to see role’s all development plans in one page. Regular user can add personal content points to his/her development plan and Leader can also add personal content points to his/her employee’s development plan. The personal content points are distinguished with different background colour from general content points (see definition 9). All the development plan content point names are shown on one page. When user wants to see content point’s description he/she must click on the information icon. After clicking the information icon, the details about the content point will appear in new modal.

Regular user and Leaders assigned to Regular User can add comments to Regular user’s content points. The comments specify status about employee’s competence described in the content point. These comments are seen by employee and his/her Leaders. One user can add only one comment per content point, but the comment can be edited. The date and time when the comment was last edited, is shown.

Regular user can see the status of each content point. There are four statuses: Not started, To-do, Done and Verified (see Figure 6.2 Statuses in user interface).

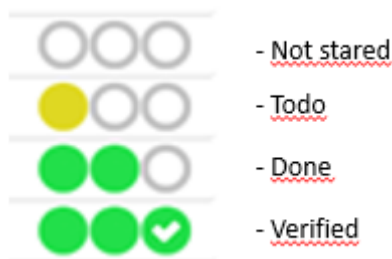


Figure 6.2 Statuses in user interface

Competence Manager can manage (add, edit and delete) general content points in all development plans. Admin can manage what user rights someone has. Admin can assign users to Leaders, manage users' roles and levels and see when all the users were last login.

6.1.3 Usage of the application

The specialists are in regular user rights. Competence Leaders and Team Managers are in Leader's rights and Competence Managers are in Competence Managers role. Head of the Software Development and Head of the Human resources are in Admin rights.

The main usage of the professional development plan is in technical development discussions. The Competence Leader explains the Development Roadmap content and assess the specialist's competences according to the development plan. When Competence Leader understands by interviewing employee that he/she has the competence described in the content point, then Competence Leader will put the content point status to Verified. When the described competence in content point is not fulfilled, but should be obtained within next year, Competence Leader will mark the content point status to To-do. When desired competence is not in the development plan, but Competence Leader or employee feels that the employee should obtain the competence, he/she will add the personal content point. For example, when the Competence Leader realises during the technical development discussion that employee has poor communication skills, Competence Leader adds the Communication training to the development plan as a personal point.

When employee gains the competence after the Technical Development Discussion, employee marks the content point status to Done. For example, when employee finishes reading the book that was described in the Development Plan, he/she will change the status to done. In that way the next time when employee is having a technical development discussion, Competence Leader can already see what the employee has done during the year.

The system was tested for the first time during the technical development discussion in 01.10.15. The group of alpha users (7 employees) was asked to test the system in period 12.10.15 – 20.10.15. The author of the thesis organized the training for Competence Leaders about carrying out the technical development discussions with Professional Development Plan on 07.01.16. Since 07.01.16 all of the technical development discussions in Helmes are held by using Professional Development Roadmap system.

This paragraph statistics are taken out on 28.03.16 using SQL scripts (see Appendix X). 65 different users have logged into the Professional Development Plan system and 38 of them have changed the status of some content point. The content point statuses have been changed for 3294 times. There are 42 users who have filled more than 10 statuses. There are 335

comments and 23 users have left the comments. There are 20 users who have more than five comments in their Development Roadmap.

The main thing what is used in the system is changing the statuses of the content point. Changing the statuses of the content point was intended to be the core of functionality. The capability to leave comments is also quite popular. The system is used in a way it was designed in the target state.

6.2 Problems solved

Updating the Professional Development Roadmaps is now much more effective and easier. The Competence Managers and Head of the Software Development can easily create an update to the content in the Professional Development Roadmaps. They can log in to the application, where they can update the content in the Professional Development Roadmaps. The Head of Software Development does not need to waste time or money for collaboration with publisher. The Professional Development Roadmaps can be updated more frequently which rises the quality of the Professional Development Roadmaps.

Previously, only software developers could track their professional development using Professional Development Roadmap as the booklet existed for the software developer role. Now employees in six other roles (see appendix IX) can track their professional development using Professional Development Roadmap. Meaning the impact of the Professional Development Roadmaps has risen significantly.

Previously, new content in the Professional Development Roadmap reached only to new employees as employees, who already had the booklets did not receive the new one. Now there is a web application that allows to update the Professional Development Roadmaps content, so the updated content reaches to all employees. This means more employees can improve their professional skills more efficiently because they have up-to-date Professional Development Roadmap.

The specialist's professional development transparency has increased significantly. Team Manager and Competence Leader can see the specialist's professional development in Professional Development Roadmap application at any given time. This enables to support specialist's professional development better. For example, specialist has agreed with his/her Competence Leader that he/she should read 3 books. Team Manager checks if specialist has read the books and when necessary, reminds to read the books. So specialist's professional development can be supported better.

Specialist improvements in the Professional Development Roadmap can be easily and clearly documented. Specialist, specialist's Competence Leader and Team Manager can comment content points in the specialists' Development Plans. They can comment each content point without worrying that there is not enough space for the comment. For example, when specialist wants to write few paragraphs about the book that he/she read, he/she can now do it in the application. The physical booklet did not have enough space for long comments. Electronic comments also eliminate the risk that the handwriting of the comment is not understandable. Having a better documentation in specialist's improvements in the Professional Development Roadmap helps to support better specialist's professional development.

Specialist do not need to carry the booklet around anymore as the Professional Development Roadmap is accessible via web application. This eliminates the risk that specialist will lose the Professional Development Roadmap. As the specialist cannot lose the booklet any more the data in the Professional Development Roadmap is better protected. Electronic links are

not uncomfortable to use any more. When previously specialists needed to retype the link from physical booklet to web browser, then now the electronic links can be opened with one click.

Helmes's Head of Software Development, whose wish was to digitize Development Roadmaps in Helmes, considers digitizing Development Roadmap system as a remarkable success (see the Appendix XI). The Head of Software Development feels that it eliminated problems, which physical booklet had and increased the impact of the Professional Development Roadmaps. Also, digitizing Professional Development Roadmaps give new opportunities for new innovative ideas.

6.3 Future development recommendations

Recommendations for future development:

- Make system available from the public network
- Enable comparing Development Roadmap current state with the previous state
- Make an assessment of the specialist's competences more precise
- Automate user rights handling
- Add features to use system in the recruitment process

The application is currently accessible only from the internal network and therefore the application is used by desktop computers (only desktop computers are in internal network in Helmes). The application should be accessible from the public network, because users want to easily access the Development Roadmap from home. Requiring VPN connection for accessing the Development Roadmap is too inconvenient. Before making the application accessible from Internet, there should be a security check made for the application. Also support for mobile devices should be improved, as employees will then be able to access the application from all kind of devices (including mobile devices).

Competence Leader, Team Leader and employee want to have an understanding of the progress in his/her specialists' professional development. There should be a way to compare the current statuses with previous content point statuses. That would enable to understand not only where employee currently is regarding to professional development, but to understand employee's professional development in the time perspective.

The assessment of the employee competences could be improved. Currently Competence Leader can either verify or not verify if the person has the competence. It is too simplified way as there might be some aspects of the competence covered better, some worse. In order to have better understanding of specialist's competences, there should be a way to evaluate competence different aspects (skill, knowledge and experience) separately in the scale. For example, there could be three scales from 1-10 to assess each aspect of the competence.

When specialist moves from one Helmes delivery team to another, the new team manager should be able to access the specialists' Development Roadmap. Currently administrator must manually remove and add viewing rights for correct manager to see specialist's Professional Development Roadmap. The information, who is specialist's current Team Manager, is held in Active Directory. The application should take the information from Active Directory and change the viewing right according to that.

Some Competence Leaders want to use the system in the recruitment process. So Competence Leaders should have a possibility to add employee candidates to the system and map the candidates' competences. When candidate becomes to work in Helmes, he/she should

be able to see the data that was mapped during the applying process. That way it takes less time to map the competences afterwards and it is easier to compare different candidates.

7 Conclusions

The goal of the thesis was to solve the problems regarding to Professional Development Roadmap physical booklets so that the Professional Development Roadmaps would support better Helmes employees' effective professional development. The goal was met by building a new custom application. Helmes's Head of Software Development considers digitizing the Professional Development Roadmap as a remarkable success and an important milestone for Helmes.

Firstly, there was mapped, how Helmes supports its employees' professional development for employees. In order to map the situation, there were used different business analyses techniques. Mapping, how Helmes supports professional development, allowed to identify the problems with initial situation. Based on the problems identified, there was modelled a target state. Based on a target state, there were elicited requirements for the needed application. The application was implemented using Scrum framework.

Application which was developed, enables to manage Professional Development Roadmaps, keep track on the employees' professional development plans and manage user rights. The biggest value, what came out from digitizing Professional Development Roadmaps, is that all the specialists have up-to-date version of Professional Development Roadmap. Increasing the quality of the content for employees supports employees' professional development.

Also, the transparency of a specialist professional development has increased significantly, which gave a great value for Helmes. Prior to the thesis, only the specialist him/herself had current overview about how he/she is doing regarding to fulfilling the Professional Development Roadmap. Now, when the system is in use, specialist's Team Manager and Competence Leader can see the progress in Professional Development Roadmap and therefore Team Manager and Competence Leader are able to support specialist better in his/her professional development.

Author of the thesis was leading the whole process of digitizing the Professional Development Roadmap. Author of the thesis conducted the business analyses and was in Product Owner's role during the development of the application. Author of the thesis learned during the thesis how to conduct business analysis and develop an application which would solve real business need.

The built application could be developed further. For example, there should be an easy way to get an overview of specialist's progress of filling the Professional Development Roadmap on certain time period. Also, the application could be improved further to use it for assessing the candidates in the recruitment process.

8 References

- [1] International Institute of Business Analysis, A Guide to the Business Analysis Body of Knowledge® (BABOK® Guide) Version 2.0, 2009.
- [2] M. Havey, Essential Business Process Modeling, Sebastopol: O'Reilly, 2005.
- [3] Scrum Alliance, "Scrum is an Agile framework for completing complex projects.," [Online]. Available: <https://www.scrumalliance.org/why-scrum>. [Accessed 24 04 2016].
- [4] K. Waters, "What Is Agile? (10 Key Principles of Agile)," 10 02 2007. [Online]. Available: <http://www.allaboutagile.com/what-is-agile-10-key-principles/>. [Accessed 20 04 2016].
- [5] J. S. Ken Schwaber, "The Scrum Guide," 2013.
- [6] Mountain Goat Software, "Scrum Product Backlog," [Online]. Available: <https://www.mountaingoatsoftware.com/agile/scrum/product-backlog>. [Accessed 24 04 2016].
- [7] S. Gupta, "Roles of team members involved in an AGILE Scrum project," Quotium, [Online]. Available: <http://www.quotium.com/performance/roles-team-members-involved-agile-scrum-project/>. [Accessed 24 04 2016].
- [8] Mountain Goat Software, "Scrum Product Owner: The Agile Product Owner's Role," [Online]. Available: <https://www.mountaingoatsoftware.com/agile/scrum/product-owner>. [Accessed 24 04 2016].
- [9] D. E. Gojko Adzic, Fifty quick ideas to improve your user stories, London: Neuri Consluting LLP, 2014.
- [10] M. Levison, "Choosing sprint length," Agile Pain Relief Consulting, 02 07 2013. [Online]. Available: <https://agilepainrelief.com/notesfromatooluser/2013/07/choosing-sprint-length-shorter-trumps-longer.html#.VxewmzB96M8>. [Accessed 20 04 2016].
- [11] H. Kniberg, Scrum and XP from Trenches, InfoQ, 2007.
- [12] M. Cohn, "Sprint Planning Meeting: When you miss the point," Mountain Goat Software, ~8 July 2013. [Online]. Available: <https://www.mountaingoatsoftware.com/blog/when-you-miss-the-point-of-sprint-planning-meetings>. [Accessed 20 04 2016].
- [13] Mountain Goat Software, "Sprint Planning Meeting," Mountain Goat Software, [Online]. Available: <https://www.mountaingoatsoftware.com/agile/scrum/sprint-planning-meeting>. [Accessed 20 04 2016].
- [14] Helmes AS, 10 Feburary 2016. [Online]. Available: <http://www.helmes.ee/>.
- [15] Helmes AS, "2014 Majandusaasta aruanne," Äriregister, Tallinn, 2015.
- [16] "Helmes Intranet," 23 Februrary 2016. [Online]. Available: <Http://Meie>.
- [17] Helmes AS, "Juhtimissüsteemi käsiraamat," Tallinn, 2015.
- [18] "Helmes References System," 23 Februray 2015. [Online]. Available: www.hrm.helmes.ee.
- [19] T. Herlavi, J. Kurkinen, M. Lang and M. Santtila, "Helmes team success factors," Aalto Executive Education, Aalto, 2015.

- [20] E. M. K. P. V. B. H. R. R. A. Anner Jürgenson, "Eesti IKT kompetentsidega tööjõu hetkeseisu ja vajaduse kaardistamine," Poliitikauuringute Keskus Praxis, Tallinn, 2013.
- [21] D. G. Jensen, "Science Magazine," 17 August 2012. [Online]. Available: David G. Jensen.
- [22] Fontes Palgakonultatsioonid OÜ, "IKT-sketori palgauuring Eesti 2015," Tallinn, 2015.
- [23] Halogen Software, "Talent space brochure," [Online]. Available: <http://www.halogensoftware.com/uploads/pdf/product-sheet/talent-space-brochure.pdf>. [Accessed 03 05 2016].
- [24] Instancy, "Competency Management Software, Comptency Management System," [Online]. Available: <http://www.instancy.com/competency-management-system.html#>. [Accessed 03 05 2016].
- [25] Instancy, "LMS pricing," [Online]. Available: <http://www.instancy.com/pricing.html>. [Accessed 03 05 2016].
- [26] "Helmes / Summer Bootcamp," 25 March 2016. [Online]. Available: <http://www.helmes.ee/bootcamp/>.

Appendix

I. Definitions

1. **Specialist** – Specialist is Helmes's employee is in one of the following role – Software Developer, Quality Assurance, Analyst, UI/UX designer.
2. **Employee level** – Employees' roles are divided to many levels. The level describes how competent employee is in his/her role. For example, levels could be junior employee, employee, senior employee, lead employee. The list is not finite.
3. **Development Plan** - Development plan is structured set of competence expectations and recommendations how to improve the competences in concrete employee level
4. **Professional Development Roadmap** – Professional Development Roadmap is a structured set of competence levels, expectations and recommendations of what, how and when a professional need to improve their competences and how to do it efficiently.
5. **Team Manager** – Team Manager is specific type of Manager. Team Manager is responsible of delivery team's overall performance and budget.
6. **Delivery team** – The smallest business unit which goal is to deliver software for Helmes clients. The delivery team consist of Team Manager and specialists. There are two kinds of delivery teams: software development and operations).
7. **Competence Leader** – Competence Leader is the person, who carries out technical development discussions. The Competence Leader must be more competent in concrete field than his/her employee to whom is he/she carrying out technical development discussion.
8. **Content point** – Content point describes one concrete competence (knowledge, experience, skill) or recommendation of how to improve the competence.
9. **General content point** – General content point is for every employee who is in concrete role and level.
10. **Personal content point** – Personal content point is a content point which is meant for specific specialist.

II. List of roles and employee levels before the application

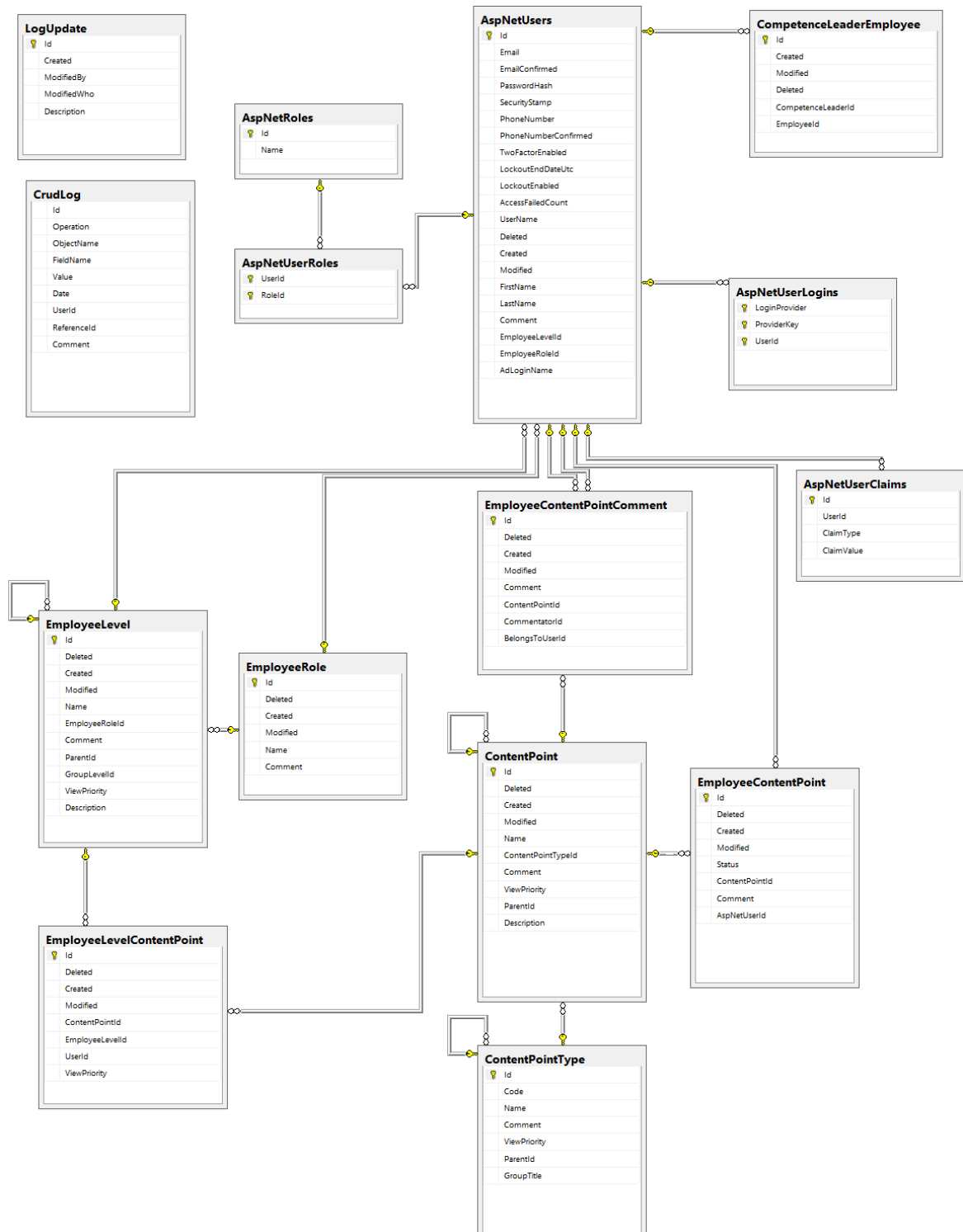
Software Developer	
	Junior Software Developer
	Software Developer
	Senior Software Developer
	Lead Developer
	Software Architect
	Technology Leader
Quality Assurance	
	Junior Tester
	Tester
	Senior Tester
	Test Manager
IT/Business Analyst	
	Junior Analyst
	Analyst
	Senior Analyst / Consultant
	Lead Analyst / Business Analyst / Senior Consultant
Business Manager	
	Business Manager
Team Manager	
	Junior Project Manager
	Project Manager
	Team Lead
UX/UI Junior Designer	
	UX/UI Designer
	UX/UI Senior Designer
	User Experience Design (UXD) architect

III. Software Developer Development Roadmap booklet structure

Software Developer		
	Entry Level	
	Way forward	
		Participate in
		Obtain the following knowledge (principles and basic skills)
	My reading list	
	My trainings	
Software Developer		
	Entry Level	
	Excellent	
	My reading list	
	Way forward	
		Participate in
		Obtain the following knowledge (principles and basic skills)
		Additional suggestions
	My trainings	
Senior Software Developer		
	Entry Level	
	Excellent	
	Way forward	
		Participate in
		Obtain the following knowledge (principles and basic skills)
	My reading list	
	My trainings	
Lead Developer		
	Entry Level	
	Excellent	
	Way forward	
		Participate in
		Obtain the following knowledge (principles and basic skills)
	My reading list	
	My trainings	
Software Architect		
	Entry Level	
	Excellent	
	Way forward	
		Participate in

		Obtain the following knowledge (principles and basic skills)
	My reading list	
	My trainings	
Technology Leader		
	Entry Level	
	Way forward	
		Obtain the following knowledge (principles and basic skills)
	My trainings & activities	

IV. Professional Development Plan system database model



V. Application feature list

1	Authentication	Can authenticate via Active Directory
2	Authentication	Can synchronize new users from Active Directory
3	Authentication	Show required fields
4	Authentication	Log off
5	Choose development plan	Choose my employee's plan
6	Choose development plan	Choose role and level
7	Choose development plan	Choose preassigned role and level by default
8	Set level	Set your employees' role and level
9	Set level	Shows currently set level
10	Set level	HINT: Shows who can set level
11	See general development plan	Show name of the content point
12	See general development plan	Show content point description
13	See general development plan	Show development plan description
14	Comment	Add comment to content point
15	Comment	Show your employees' content point comments
16	Comment	Show your content point comments
17	Comment	Edit content point comment
18	Comment	Open all comments
19	Comment	HINT: Show toggle comments
20	Comment	HINT: Show add comment
21	Status	Show your employees' content point statuses
22	Status	Change your employees' statuses to: Not Started, To-do, Done, Verified
23	Status	HINT: Show status name
24	Filter	Filter content points based on statuses
25	Filter	Show filter name
26	Overview	Show compact view (content point name and current status) of development plan
27	Status	Show your content points statuses
28	Status	Change your content point statuses to: Not Started, To-do, Done
29	Personal content point	See your employees' personal points
30	Personal content point	See personal content point
31	Personal content point	Add personal content point
32	Personal content point	Edit personal content point

33	Personal content point	Delete personal content point
34	Manage development plan	Add general content point to development plan
35	Manage development plan	Edit general content point
36	Manage development plan	Delete general content point
37	Manage development plan	Change development plan description
38	See all employees information	See all users names
39	See all employees information	See all users role and level
40	See all employees information	See all employee's Leaders
41	Manage user rights	Add user to Leader, Competence Manager, Admin user rights
42	Manage user rights	Remove user from Leader, Competence Manager, Admin user rights
43	Manage user rights	Add access to Leaders to certain users
44	Manage user rights	Remove access from Leaders to certain users
45	Manage user rights	Add all users role and level
46	Manage user rights	Remove all users role and level

VI. Professional Development Plan users' rights

Feature ID	User Role	Admin	Compe- tence Manager	Leader		Regular user	Anony- mous
	Tabs	Admin	Manage Plans	Employee's Plans	Personal Plan	Main Page	Log in
1		-	-	-	-	-	x
2		x	-	-	-	-	-
3		-	-	-	-	-	x
4		x	x	x	x	x	-
5		-	-	x	-	-	-
6		-	x	x	x	x	-
7		-	-	x	x	x	-
8		x	-	x	-	-	-
9		-	-	x	x	x	-
10		-	-	x	x	x	-
11		-	x	x	x	x	-
12		-	x	x	x	x	-
13		-	x	x	x	x	-
14		-	-	x	x	x	-
15		-	-	x	-	-	-
16				-	x	x	
17		-	-	x	x	x	-
18		-	-	x	x	x	-
19		-	-	x	x	x	-
20		-	-	x	x	x	-
21		-	-	x	-	-	-
22		-	-	x	-	-	-
23		-	-	x	x	x	-
24		-	-	x	x	x	-
25		-	-	x	x	x	-
26		-	-	x	x	-	-
27		-	-	-	x	x	-
28		-	-	-	x	x	-
29		-	-	x	-	-	-
30		-	-	x	x	x	-
31		-	-	x	x	x	-
32		-	-	x	x	x	-
33		-	-	x	x	x	-
34		-	x	-	-	-	-
35		-	x	-	-	-	-

36		-	x	-	-	-	-
37		-	x	-	-	-	-
38		x	-	-	-	-	-
39		x	-	-	-	-	-
40		x	-	-	-	-	-
41		x	-	-	-	-	-
42		x	-	-	-	-	-
43		x	-	-	-	-	-
44		x	-	-	-	-	-
45		x	-	-	-	-	-
46		x	-	-	-	-	-

VII. Alpha user's prequestionnaire

1. Mis rollis (tarkvaraarendaja, analüütik jne) oled töötanud ja kui kaua?
2. Kuidas sa suhtud arenguplaani, on see sinu jaoks kasulik?
3. Kui hästi sa oma rolli Helnese arenguplaani tunned? üldse mitte 1-10 väga hästi
4. Kas oled kokku puutunud arenguplaani vihikuga? Kui jah siis kuidas ja kui palju sa seda kasutanud oled?
5. Millises keskkonnas (tööl, kodus) ja millistel aegadel (puhkehetked tööl, vabal ajal) sa arenguplaani vihikut tavaliselt täitnud oled?
6. Mis sulle vihiku kasutamise juures kõige rohkem meeldib/ ei meeldi?
7. Milliseid eeliseid/puudusi sinu arvates vihiku formaadist infosüsteemi üleminek kaasa toob?

VIII. Alpha users after questionnaire

1. Mis sulle PD infosüsteemi juures meeldis?
2. Mis sulle PD infosüsteemi juures ei meeldinud?
3. Kuidas sa hindad süsteemi valmisolekut live'i minekuks?
4. Mis tuleks kindlasti ära parandada enne live'i minekut?
5. Kuidas sulle meeldis uuringus osaleda?
6. Kas sa oleksid nõus tulevikus sarnastes uuringutes osalema?
7. Mis sulle kasutatavuse uuringu juures meeldis/ ei meeldinud?
8. Kuidas oleks sinu meelest võimalik selliseid uuringuid paremini läbi viia?

IX. List of roles and levels in the application

Software Developer	
	Junior Software Developer
	Software Developer 1
	Software Developer 2
	Senior Software Developer 1
	Senior Software Developer 2
	Lead Developer 1
	Lead Developer 2
	Software Architect 1
	Software Architect 2
	Technology Leader
Quality Assurance	
	Junior Tester
	Tester
	Senior Tester
	Test Manager
IT/Business Analyst	
	Junior Analyst
	Analyst
	Senior Analyst / Consultant
	Lead Analyst / Business Analyst / Senior Consultant
Business Manager	
	Business Manager
Team Manager	
	Junior Project Manager
	Project Manager
	Team Lead
UX/UI Junior Designer	
	UX/UI Designer
	UX/UI Senior Designer
	User Experience Design (UXD) architect
DevOps	
	DevOps
Other	
	Junior
	Specialist
	Senior
	Lead

X. SQL scripts

1) Get number of general content points by roles

```
select EmployeeRole.Name, count(*) from EmployeeLevelContentPoint
Join ContentPoint ON (EmployeeLevelContentPoint.ContentPointId = ContentPoint.id)
join EmployeeLevel ON (EmployeeLevel.Id = EmployeeLevelContentPoint.EmployeeLevelId)
join EmployeeRole ON (EmployeeRole.id = EmployeeLevel.EmployeeRoleId)
where ContentPoint.Deleted = 0 and EmployeeLevelContentPoint.UserId is null
group by EmployeeRole.Name
```

2) Get number of personal content points by role

```
select EmployeeRole.Name, count(*) from EmployeeLevelContentPoint
Join ContentPoint ON (EmployeeLevelContentPoint.ContentPointId = ContentPoint.id)'
join EmployeeLevel ON (EmployeeLevel.Id = EmployeeLevelContentPoint.EmployeeLevelId)
join EmployeeRole ON (EmployeeRole.id = EmployeeLevel.EmployeeRoleId)
where ContentPoint.Deleted = 0 and EmployeeLevelContentPoint.UserId is not null
group by EmployeeRole.Name
```

3) Get number of content points with description

```
select EmployeeRole.Name, count(*) from EmployeeLevelContentPoint
Join ContentPoint ON (EmployeeLevelContentPoint.ContentPointId = ContentPoint.id)
join EmployeeLevel ON (EmployeeLevel.Id = EmployeeLevelContentPoint.EmployeeLevelId)
join EmployeeRole ON (EmployeeRole.id = EmployeeLevel.EmployeeRoleId)
where ContentPoint.Deleted = 0 and ContentPoint.Description is not null
group by EmployeeRole.Name
```

4) Get number of content points by topics

```
select ContentPointType.Name, count(*) as 'Number of content points' from ContentPoint
join ContentPointType on (ContentPointType.Id = ContentPoint.ContentPointTypeId)
where ContentPoint.Deleted = 0
group by ContentPointType.Name
order by 'Number of content points' desc
```

5) Get number of times statuses changed

```
select count(*) from CrudLog
where Operation = 'Update' and ObjectName = 'DbEmployeeContentPoint'
```

6) Get number users who have changed statuses

```
select count(DISTINCT UserId) from CrudLog
where Operation = 'Update' and ObjectName = 'DbEmployeeContentPoint'
```

7) Get number of comments

```
select count(*) from EmployeeContentPointComment
```

8) Get number of commentators

```
select count(DISTINCT CommentatorId) from EmployeeContentPointComment
```

9) Get how many comments concrete user have

```
select BelongsToUserId, count(*) as howMany
from EmployeeContentPointComment
group by BelongsToUserId
```

10) Get how many statuses

```
select AspNetUserId, count(*) from CrudLog
join EmployeeContentPoint ON (EmployeeContentPoint.Id = CrudLog.ReferenceId)
where FieldName = 'Status'
group by AspNetUserId
```

11) Get who have been and how many comments to others

```
select CommentatorId, count(*)
from EmployeeContentPointComment
join AspNetUsers on (AspNetUsers.Id = CommentatorId)
```

```
where CommentatorId != BelongsToUserId  
group by CommentatorId
```

XI. A letter from Head of Software Development

I consider the digital Development Roadmap information system as a remarkable success and an important milestone for Helmes as an integral part of Helmes Development Accelerator strategy that provides accelerated personal learning for all Helmes professionals. Before having the digital system there were many issues with the implementation of professional development plan due to problems with keeping the documents up-to-date and problems with sharing the updated information between managers and other professionals. The whole process, professional development status and progress had low transparency, there were many separate documents and systems where the information was kept and this caused inefficiencies and confusion when implementing the process throughout the organization. The new digital system eliminates these issues by providing a digital platform which create possibility for new innovative ideas that have already arisen from using the system by different stakeholders and this increases the utilization and impact of the professional development plan.

Oliver Stimmer's role and responsibility in this project started in summer 2015 when he joined Helmes as an IT Project Manager. He participated throughout the whole design, development and implementation cycle mainly in Product and Project Manager roles. In addition, he conducted and took part in business and IT analysis, technical design, infrastructure planning, UI prototyping, managing development team, testing, training users and drove the implementation of using the new system and process throughout Helmes organization. This involved over 20 software development teams and required cooperation and coordination with stakeholders from Human Resources, Marketing and Operations department. Oliver's professional attitude, dedicated effort and active engagement throughout the project was key part of the whole project success.

Meelis Lang, Helmes Head of Software Development

XII. License

Non-exclusive license to reproduce thesis and make thesis public

I, Oliver Stimmer,

(author's name)

1. herewith grant the University of Tartu a free permit (non-exclusive license) to:
 - 1.1. reproduce, for the purpose of preservation and making available to the public, including for addition to the DSpace digital archives until expiry of the term of validity of the copyright, and
 - 1.2. make available to the public via the web environment of the University of Tartu, including via the DSpace digital archives until expiry of the term of validity of the copyright,

of my thesis

Digitizing Helmes Professional Development Roadmaps,

(title of thesis)

supervised by **Fredrik Payman Milani,**

(supervisor's name)

2. I am aware of the fact that the author retains these rights.
3. I certify that granting the non-exclusive license does not infringe the intellectual property rights or rights arising from the Personal Data Protection Act.

Tartu, **12.05.2016**